H.R. 1538—NATIONAL ELECTRIC VEHICLE ACT OF 1991

HEARING

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT

OF THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED SECOND CONGRESS

FIRST SESSION

MAY 16, 1991

[No. 48]

Printed for the use of the
Committee on Science, Space, and Technology

U.S. GOVERNMENT PRINTING OFFICE

46-207 cc WASHINGTON : 1991

For sale by the U.S. Government Printing Office
Superintendent of Documents, Congressional Sales Office, Washington, DC 20402
ISBN 0-16-035606-7

H 701-76.

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

GEORGE E. BROWN, JR., California, *Chairman*

JAMES H. SCHEUER, New York
MARILYN LLOYD, Tennessee
DAN GLICKMAN, Kansas
HAROLD L. VOLKMER, Missouri
HOWARD WOLPE, Michigan
RALPH M. HALL, Texas
DAVE McCURDY, Oklahoma
NORMAN Y. MINETA, California
TIM VALENTINE, North Carolina
ROBERT G. TORRICELLI, New Jersey
RICK BOUCHER, Virginia
TERRY L. BRUCE, Illinois
RICHARD H. STALLINGS, Idaho
JAMES A. TRAFICANT, JR., Ohio
HENRY J. NOWAK, New York
CARL C. PERKINS, Kentucky
TOM McMILLEN, Maryland
DAVID R. NAGLE, Iowa
JIMMY HAYES, Louisiana
JERRY F. COSTELLO, Illinois
JOHN TANNER, Tennessee
GLEN BROWDER, Alabama
PETE GEREN, Texas
RAY THORNTON, Arkansas
JIM BACCHUS, Florida
TIM ROEMER, Indiana
BUD CRAMER, Alabama
DICK SWETT, New Hampshire
MICHAEL J. KOPETSKI, Oregon
JOAN KELLY HORN, Missouri

ROBERT S. WALKER, Pennsylvania*
F. JAMES SENSENBRENNER, JR., Wisconsin
SHERWOOD L. BOEHLERT, New York
TOM LEWIS, Florida
DON RITTER, Pennsylvania
SID MORRISON, Washington
RON PACKARD, California
PAUL B. HENRY, Michigan
HARRIS W. FAWELL, Illinois
D. FRENCH SLAUGHTER, JR., Virginia
LAMAR SMITH, Texas
CONSTANCE A. MORELLA, Maryland
DANA ROHRABACHER, California
STEVEN H. SCHIFF, New Mexico
TOM CAMPBELL, California
JOHN J. RHODES, III, Arizona
JOE BARTON, Texas
DICK ZIMMER, New Jersey
WAYNE T. GILCHREST, Maryland

RADFORD BYERLY, JR., *Chief of Staff*
MICHAEL RODEMEYER, *Chief Counsel*
CAROLYN C. GREENFELD, *Chief Clerk*
DAVID D. CLEMENT, *Republican Chief of Staff*

SUBCOMMITTEE ON ENVIRONMENT

JAMES H. SCHEUER, New York, *Chairman*

HENRY J. NOWAK, New York
DICK SWETT, New Hampshire
HOWARD WOLPE, Michigan
MICHAEL J. KOPETSKI, Oregon
JOAN KELLY HORN, Missouri
RALPH M. HALL, Texas
TOM McMILLEN, Maryland

DON RITTER, Pennsylvania
SID MORRISON, Washington
CONSTANCE A. MORELLA, Maryland
DICK ZIMMER, New Jersey

EILEEN LEE, *Staff Director*
CURT STANFORD, *Technical Consultant*
JOEL EISEN, *Minority Counsel*

---

*Ranking Republican Member.

CONTENTS

WITNESSES

Page

May 16, 1991:

Hon. J. Michael Davis, Assistant Secretary for Conservation and Renewable Energy, DOE, Washington, DC; accompanied by Al Chesnes, Office of Transportation Technologies, DOE 6

William F. Powers, Executive Director, Research Staff, Ford Motor Co., Dearborn, Michigan 15

Ken Baker, Manager, Electric Vehicle Program, General Motors Corp., Warren, Michigan 23

Robert L. Davis, Executive Engineer, Special Projects Engineering Office, Chrysler Corp., Highland Park, Michigan 33

Armando Greco, Executive Director, Lehigh and Northampton Transportation Authority, Allentown, Pennsylvania 55

Norm Bryan, Vice President, Pacific Gas and Electric, Santa Rosa, California 64

Robert F. Steinke, Vice President, Business and Technical Support, Public Service Electric and Gas, Newark, New Jersey 74

Vern Pruett, Engineer, Systems Development, Los Angeles Department of Water and Power, Los Angeles, California 86

Alan Krupnick, Senior Fellow, Quality of Environment Division, Resources for the Future, Washington, DC 98

Jim MacKenzie, Senior Associate, World Resources Institute, Washington, DC 105

Subcommittee markup of H.R. 1538—The National Electric Vehicle Act of 1991 135

Full Committee markup of H.R. 1538—The National Electric Vehicle Act of 1991 179

Appendix: Written testimony submitted by the Electric Transportation Coalition 203

H.R. 1538—NATIONAL ELECTRIC VEHICLE ACT OF 1991

THURSDAY, MAY 16, 1991

U.S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
SUBCOMMITTEE ON ENVIRONMENT,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:36 a.m. in room 2318, Rayburn House Office Building, Hon. James Scheuer [chairman of the subcommittee] presiding.

Mr. SCHEUER. The Subcommittee on Environment will come to order.

First I would like to ask unanimous consent for taping by the media. There being no objection, so ordered.

Today the Subcommittee on Environment will consider H.R. 1538, the National Electric Vehicle Act of 1991, introduced by our colleague and Chairman, the Honorable George Brown of California, continuing an effort he engaged in as long as 15 years ago to bring an electric car in America to reality.

The National Electric Vehicle Act authored by Congressman Brown addresses two of the most difficult challenges faced by our Nation: first, energy conservation; and second, air pollution.

The transportation section of our economy accounts for more than 60 percent of petroleum consumed in the United States, and more than 70 percent of that petroleum is consumed by passenger cars and trucks. Clearly any serious effort toward conservation of energy must include motor vehicles.

Motor vehicles also account for almost 25 percent of all carbon dioxide emissions from fossil fuels, 400 million tons a year. Clearly any major reductions in air pollution must include the transportation sector of our economy.

It is perhaps one of the great ironies of our time that a country that was willing to spend billions upon billions of dollars to protect our access to Persian Gulf oil and to risk 550,000 of its finest young men and women in a military effort to protect those lines of access, that same country would be unwilling to call upon its citizens to make any changes in their behavior, engage in any tightening of the belts, would be unwilling to spend an infinitesimal fraction of what we have already spent to protect access to Persian Gulf oil to find alternatives to that selfsame Persian Gulf oil.

Congressman Brown has spent considerable time and effort over the last 15 years, as I mentioned, to foster the development of electric vehicles. He sponsored in 1976 the Electric and Hybrid Vehicle

Research and Development Act which established the electric vehicle research program at the Department of Energy.

Despite pusillanimous and lackluster funding support by previous Administrations—of both parties, I might add—that Act now has this Nation well positioned to be at the forefront of the emerging electric car technology.

At this time I take great pleasure in recognizing the Chairman of the Committee on Science, Space and Technology, and the original sponsor going back a decade and a half of the concept of the electric car, Congressman George Brown of California.

Mr. BROWN. Thank you very much, Chairman Scheuer.

I have a prepared statement, and I would like to ask unanimous consent that the full text be included in the record. Let me just quickly read a paragraph from that in deference to the need to hear from our very distinguished witnesses, and also in view of the fact that we may have some pressures on our time as we have a visit from the Queen of England later this morning.

Mr. Chairman, I'm greatly heartened by the support which H.R. 1538 has received this year from industry and from State and local governments. I am especially pleased, however, by the support from a wide range of Members of Congress who recognize that our Nation must waste no time in putting alternative fuel vehicles on our roads.

With the support from this Subcommittee, the entire Science Committee, and the Energy and Commerce Committee, I am positive that the 102nd Congress may be remembered as the one that got us over the hump and moving forward with a strong, commercially viable electric vehicle program for the sake of our Nation and for the world.

Thank you very much, Mr. Chairman, for your leadership in this also.

[The prepared statement of Mr. Brown follows:]

OPENING STATEMENT BY CONGRESSMAN GEORGE E. BROWN, JR.

before the

SUBCOMMITTEE ON ENVIRONMENT

COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

MAY 16, 1991

2318 RAYBURN HOUSE OFFICE BUILDING

Chairman Scheuer, Members of the Subcommittee on Environment, I appreciate the opportunity to speak this morning on H.R. 1538, The National Electric Vehicle Act of 1991. For close to 15 years I have been involved in promoting the commercialization of electric vehicles. With the events in the Persian Gulf still fresh in our minds; with the disturbing news from the science community that our ozone layer is diminishing further; and with air pollution blanketing so many of our nation's cities; I believe the bill before you takes on an added measure of importance.

While it is convenient these days to link the Persian Gulf Crisis to almost any energy and/or environment-related measure, I think you will find that The National Electric Vehicle Act of 1991 is designed to address two national imperatives: the urgent need to develop transportation methods that will preserve or ultimately enhance air quality, and the need to develop transportation methods that can relieve our dangerous and costly reliance on imported oil.

Although it has been more than 15 years since I first introduced legislation to promote electric vehicles, with the impressive array of cosponsors on this year's bill, numbering 68 to date, I believe this will be the year we move electric vehicle research to the front of the R & D line. With your support, I am confident we can do it.

Following my brief remarks, an array of speakers will explain the details of the bill and how it is designed to work in conjunction with existing resources. You will hear from members of the battery consortium who are counting on funds appropriated through this bill to combine with private sector funds being used to develop electric vehicle technologies, including an advanced battery. You will hear from members of the electric utility industry who will take part in a research effort that looks into the infrastructure needed to support electric vehicles. This bill also will establish a demonstration program designed to make electric vehicles a more affordable and a more realistic option.

For national security reasons and as an environmental imperative, we must develop alternatives to gasoline-powered vehicles. Nearly one-half of the oil consumed in the United States is imported, and of that amount more than one-quarter is imported from the Middle East. The transportation sector accounts for nearly two-thirds of total oil consumption in our country, and of that amount passenger cars and trucks represent more than 70 percent of the oil used.

It is not enough simply to dismiss calls for further exploration of oil and gas in environmentally pristine areas of this nation if we do not also offer alternatives to that plan. This legislation can be part of that alternative energy strategy.

Enactment of this legislation will help us develop cost effective steps to reduce emissions that cause smog and carbon monoxide without causing damage to commerce and the economy. Even taking into account the emissions produced in generating electricity to recharge vehicles, EV's show a 98 percent reduction of major pollutant emissions. There are some estimates that we could reduce emissions by 160,000 tons a year by replacing just one percent of the vehicles registered today with electric vehicles.

Mr. Chairman, I am greatly heartened by the support which H.R. 1538 has received this year from industry, and state and local governments. I am especially pleased, however, by the support from a wide range of Members of Congress who recognize that our nation must waste no time in putting alternative-fuel vehicles on our roads. With the support from this subcommittee, the entire Science Committee and the Energy and Commerce Committee, I am positive that the 102nd Congress may be remembered as the one that got us over the hump and moving forward with a strong electric vehicle program for the sake of our nation and our world.

Mr. SCHEUER. We'll hear first from—

Mr. MCMILLEN. Mr. Chairman?

Mr. SCHEUER. Yes?

Mr. MCMILLEN. May I make just a brief comment?

Mr. SCHEUER. By all means. I'm sorry, Congressman.

Mr. MCMILLEN. I always tell you I'm sitting down over here. That's why you don't see me, Mr. Chairman.

Mr. SCHEUER. Yes. Please make your statement. Congressman Tom McMillen.

Mr. MCMILLEN. I certainly want to commend you and, of course, Chairman Brown for your initiatives in this area. As you said, it is somewhat ironic that we put all these resources to bear in Desert Storm and all this technology because of a dependence on foreign oil, that we don't have the same kind of focus here at home to try and avert those kinds of actions in the future.

I think really what is very important about Chairman Brown's initiative is that we can ultimately provide alternatives to the consumer besides a petroleum-based automobile, particularly on short-haul routes and if we put our technical minds to bear on this, that we can come up with effective battery technology that can make a difference— clearly part of a comprehensive energy plan for this country. I want to thank the Chairman for moving ahead on this hearing.

Mr. SCHEUER. Thank you, Mr. McMillen, one of our truly hard-working and productive junior Members.

First we'll hear from the Honorable Michael Davis, Assistant Secretary for Conservation and Renewable Energy at the Department of Energy. Mr. Davis has appeared before us several times. He has always been a very forthcoming and thoughtful witness, and we are very happy to have you back here again this morning, Mr. Davis.

You are accompanied by Mr. Al Chesnes of the Office of Transportation Technologies in the DOE. We're happy to have you, too, Mr. Chesnes.

Please take seven or eight minutes and sum up your testimony. Of course—and this goes for all of the witnesses—we're going to be on the five-minute rule later on, but you should know that your testimony as prepared will be printed in its entirety at the point at which you testify.

Please proceed, Mr. Davis.

STATEMENT OF HON. J. MICHAEL DAVIS, ASSISTANT SECRETARY FOR CONSERVATION AND RENEWABLE ENERGY, U.S. DEPARTMENT OF ENERGY, WASHINGTON, D.C.; ACCOMPANIED BY: AL CHESNES, OFFICE OF TRANSPORTATION TECHNOLOGIES, U.S. DEPARTMENT OF ENERGY

Mr. DAVIS. Thank you, Mr. Chairman and Mr. Brown.

I will just summarize my testimony. There's a couple of points I would like to make.

I think we have made substantial progress since last year in our electric and hybrid vehicle program. I would point out that our budget request for 1992 is 66 percent higher than last year's appropriations in these areas, so I think we got the message. And I

would like to say for the record there's a lot of years of effort certainly by some people within the Department of Energy that I'd like to recognize. Mr. Chesnes and his entire staff, for the record, have done a very good job of trying to move these technologies along for a number of years, sometimes without a great deal of support. So from our side we have a pretty good resource. I think they have good credibility with the industry. It is fortunate that we have the staff capability that we do in this area, so I would like to recognize that this morning.

With respect to the bill, it absolutely is—the objective is on the target. It has all the right pieces. We would like to discuss a couple of issues with you in a little bit more detail in terms of dates and timing and some of the ongoing programs that we already have underway, particularly with respect to some of the cost shares of those programs and cost sharing that is specified in the new bill. I think those are all details with which a little bit of discussion would ensure success.

You're going to hear a little bit later from the Battery Consortium. I'll just go over that. I think that represents, from an implementation point of view, exactly what we need to do.

We need to have a very positive relationship between government and industry. We need to work on problems that are generic jointly as an efficient, economic thing to do. I know you support that. We're glad to see your direct involvement in a trip to Detroit a couple of weeks ago on that general topic.

I think really I would just leave it there and open us up for questions. Again I would say this is very much going in the right direction. It has got the right pieces, and it really is just a matter of making sure that we link up our existing programs in such a way that we don't produce any overlap and that the timing in some cases, which is quite important, we look at that very carefully from a success standpoint.

With that, I'd be pleased to answer any questions.

[The prepared statement of Mr. Davis follows:]

Statement of J. Michael Davis
Assistant Secretary for Conservation and Renewable Energy
U.S. Department of Energy

Committee on Science, Space, and Technology
Subcommittee on Environment
U.S. House of Representatives

May 16, 1991

Mr. Chairman and Members of the Committee, I appreciate the opportunity to discuss the views of the Department of Energy (DOE) on H.R. 1538, the National Electric Vehicle Act of 1991. The bill addresses many of the issues we raised in testimony last year on H.R. 3851.

The overall objective of the bill is to accelerate the development and demonstration of electric vehicle technology in the United States. This objective is directly in accord with our ongoing activities in the Electric and Hybrid Vehicle Program. The Electric and Hybrid Vehicle Program is a major component of our Transportation R&D effort focused on meeting future energy demands with reduced dependence on petroleum-based fuels and with lower vehicle emissions.

Our commitment to this objective is reflected in our budget request for FY 1992, which is 66 percent higher than last year's appropriation in the Electric and Hybrid Vehicle program area. In addition, we have sharpened our focus in this area, as in the rest of our program, to emphasize our most promising technologies with increased and accelerated effort. Our intent is to make our programs more market- and results-oriented, bringing supply and demand issues together in ways that make internal management and external relationships more effective and consistent.

This new approach is already starting to pay dividends in the electric vehicle program. Our efforts to target the most promising battery alternatives have led to the formation of the U.S. Advanced Battery Consortium. The Consortium was established by General Motors, Ford, and Chrysler on January 30 of this year--and cleared by the Department of Commerce on March 4--to conduct a major multi-year research and development effort to develop advanced batteries for electric vehicles. The consortium plans to conduct a cost-shared program with DOE, with 50 percent of the funding to be provided by the automobile, utility, and battery industries. Since the consortium will testify later this morning, I will not go into more detail on planning and status; however, I will point out that our FY 1992 budget request includes $27 million to support the effort.

The development of a high-performance, low-cost battery is essential to the successful demonstration and commercialization of the electric vehicle. The market cannot be forced. Customers must be satisfied that the electric vehicle they purchase provides range, performance, auxiliary equipment, and trouble-free operation comparable to that of petroleum-based vehicles, and at a competitive price. Even with subsidies to eliminate cost barriers, an electric vehicle which does not stand up to the non-electric competition will not be successful, and premature demonstrations could have a negative impact on future commercialization.

Title I of the proposed legislation covers the establishment of joint research and development projects with industry on electric vehicle technologies. The Department already has aggressive and extensive program activities in most of

the technology areas covered, and we believe the effort being initiated with the battery consortium will serve as a model for joint cooperative industry/government R&D projects. Cost-shared cooperative efforts are also under way with industry on electric power trains and fuel cells, and major programs which have direct application to electric vehicle use are being carried out in the photovoltaics area under our Office of Utility Technologies. For all of these activities, comprehensive planning and an effective technology transfer program are major ingredients in our overall strategy. Although we are in general agreement with the objectives of Title I, some clarification may be necessary to clearly differentiate between on-going programs and future program activities, and to establish timetables which consider all of the steps required to accomplish planning and procurement actions.

Title II of the proposed legislation covers three subtitles. Subtitle A is similar to the demonstration activities required under H.R. 3852, but has taken into account most of the safeguards and flexibilities recommended in our previous testimony. Although the legislation now permits the use of interim technology such as hybrids, and sets schedules and criteria which allow for the proper consideration of battery development progress, we would prefer that the bill allow DOE and the auto industry to set the timing of any demonstration activities beyond the current Electric Vehicle User Task Force. We still strongly believe that requiring demonstrations before technologies are ready would be counterproductive.

Title II, subtitle B, requires the establishment of a data collection program

on the operation of electric or other clean alternative fuel vehicles. Although we are in complete agreement on the value of compatible data for potential users of alternative fuel vehicles, there are already programs under way which collect such data. The National Personal Transportation Survey conducted by the Department of Transportation collects and makes available information on transportation demographics. This information is supplemented by the Residential Transportation Energy Consumption Survey conducted by the Energy Information Administration. In addition, as part of the implementation of the Alternative Motor Fuels Act, we are establishing a National Alternative Fuel Data Center at the Solar Energy Research Institute which will collect and analyze performance, operational and emissions data on all of the available engine/fuel/vehicle combinations. In light of these activities, this subtitle is not needed and may cause duplication of effort.

Title II, subtitle C, amends the Energy Policy and Conservation Act to include electric vehicles as one of the alternative fuel vehicles to be acquired for the federal fleet under the Alternative Motor Fuels Act (AMFA). This would be an appropriate action, consistent with the Department's overall policy, which treats electricity as an alternative fuel. However, the legislation should make clear that it does not require the acquisition of electric vehicles under AMFA if electric vehicles are not available at prices reasonably competitive with other alternative fuel vehicles.

Title III establishes a program for research, development, and demonstration of the infrastructure requirements for widespread commercialization of electric vehicles. While we certainly recognize the need for infrastructure

development, the basic requirement parameters are directly linked to the vehicle battery/propulsion system, and a structured program at this time would be premature. A critical element in the work proposed by the battery consortium is the implementation of an Infrastructure Task Force which will address this issue. As requirements are identified by the task force, it is our plan to initiate program activities to develop the required technology base. We believe that the actions required by the proposed legislation are one to two years too early. We will address them in future budget requests, so a mandate at this time is not appropriate.

In summary, we believe the proposed National Electric Vehicle Act of 1991, H.R. 1538, is in general agreement with the course of action that our current program is on. Our major differences concern timing and integration with our ongoing activities. Overall, we are focused on the same objectives--the early commercialization of viable electric vehicles that will assist in our efforts to reduce our Nation's dependence on petroleum and improve our air quality.

Thank you for the opportunity to appear before you. I would be pleased to answer any of your questions at this time.

Mr. SCHEUER. Congressman Brown, we'd invite you to start off the questioning.

Mr. BROWN. First, let me thank you, Mr. Davis, and also Mr. Chesnes, for the work that you have maintained in the Department over the years. I'm aware of both the progress you have made and the difficulties that you have had over there because of the erratic nature of the support, both in the Executive and Legislative Branches, in terms of funding and so forth. It really does make it difficult to carry out a strong, long-range program. I think we are all aware of that.

I'm also aware of the fact that it is a fairly typical attitude in the Executive Branch to feel that when they have a good program going—and I think you do have a good program going over there—you really don't want to have too much direction and guidance, at least at the level that we sometimes refer to as micromanagement from the Legislative Branch, and we want to avoid that, too.

Very honestly, this bill has been put forth with the thought that it needs to be satisfactory to all the partners involved, that the private industry partners, the government departments, and so forth, but that we still do need a legislative framework which would have at the minimum the value of making the Congress feel that they were partners in this operation, also. Sometimes there is a little mismatch in the sense that the Executive Branch doesn't quite understand that the Congress really does want to be partners in some of these things, particularly if we think there is going to be any political benefit derived from it.

I recognize from reading your statement in more detail that you have no basic objection to the legislative structure, but that you have a little problem with the timing and the schedules that are set forth there. I just wanted to explore that with you fairly briefly.

In other words, you don't really oppose the market demonstration program, per se, but you think that because the battery technology is not yet mature that it is a little too soon to have a program for demonstration vehicles. Am I correct in that?

Mr. DAVIS. Yes, sir, that's correct.

Mr. BROWN. Yes.

Mr. DAVIS. As an example, if we looked under Title II, we talk about not later than one year after date of enactment, DOE shall request proposals to demonstrate vehicles. That would basically—hopefully this will pass soon. That's our belief, that this will, indeed, pass and set the course for this program over a longer period of time. With the consortium coming up to speed and a number of players finally specifying where this technology really is, it is possible that people would be proposing issues before we were really even clear about exactly how we should solicit and what some of the details would be.

As you will hear, I think, in a few minutes, within the Battery Consortium there are various subcommittees, if you will, that will look at some of the issues—for instance, infrastructure needs—and that will take on more definition. And I really believe that the Department of Energy certainly would want to check for that experience and insight before we tried to solicit out ahead of it.

Really, again, it is just an issue of timing. All the right pieces are here, and everything that is here is necessary. It is just a question of phasing.

Mr. BROWN. As I understand it, the Battery Consortium and the Department expect to have an advanced battery—one or more—ready for commercial production somewhere in the vicinity of the year 1994. Am I correct in this?

Mr. DAVIS. Yes, sir, that's correct.

Mr. BROWN. Yes. The point I wish to emphasize here is whether or not we will be able to put all these pieces together unless we get started now in planning for that demonstration program. I think you're well aware that nothing we do in this bill, even if we passed it expeditiously, is going to affect anything until fiscal year 1993 probably because we won't be able to appropriate money under this bill until fiscal year 1993, so I'm suggesting to you that moving this bill along on this schedule will not allow us to put a demonstration program in until about the time that the batteries are on line anyway. Is that—am I thinking correctly on this?

Mr. DAVIS. I think that is correct. I would just add one other thing, and I think this is an important aspect of the bill. We read this as—when we talk about electric vehicles, that encompasses hybrid vehicles.

Mr. BROWN. Yes.

Mr. DAVIS. We think that's an essential aspect, and I think that, as well, reduces some of our timing concerns. If this was strictly battery/electric without any other provision, then I think we'd be even more concerned about the timing.

Mr. BROWN. Yes.

Mr. DAVIS. But that has been addressed and we appreciate that.

Mr. BROWN. Well, we are trying to be as cooperative as possible, but we are looking at a situation where California is going to require that there be 40,000 electric vehicles or something that will be zero emitting in 1998. That's the law in California. And we are concerned that in order to meet that standard we will have to have a demonstration—have to complete the battery research work, have to have a demonstration program, and then have to have a vehicle production program that will all take place in a very brief period of time. It will take a year or two for the industry to get tooled up after the battery problem has been solved, and we're anxious to see all of these pieces fit smoothly into place.

Now, if we have completely misjudged the timing in the bill, there is no reason why we can't defer a demonstration for another year or something of that sort, but we don't want to get to the point where we don't have a program that will supply the 1998 needs for vehicles in California, which continue to grow progressively each year after that. We have to be concerned about having all of this on track.

Mr. DAVIS. Well, I think up to say one year's flexibility in some of these issues is completely adequate to address any of our concerns. We're not talking about three years or two years; we're talking about in some cases months, and in some cases at most a year.

Mr. BROWN. Well, I'm very pleased that you think we're that close together, because as far as I am concerned we are more than willing to have at least that degree of flexibility. What we are con-

cerned about is that we all be enthusiastic partners here and not have you feel that Congress is pushing you beyond what you can do, have the industry feel that we are unrealistic, or have anybody feel that the whole program is not going to meet the needs which are now pretty well fixed by what has been done with California in the leadership here.

Thank you very much, Mr. Chairman.

Mr. SCHEUER. Thank you, Mr. Chairman.

Congresswoman Horn?

Ms. HORN. I have no questions, sir.

Mr. SCHEUER. All right.

In deference to our time problem, I'm going to try and get all the witnesses to present their testimony. We'll send you some further questions that I have by mail if that's okay.

Mr. DAVIS. Yes, sir. Thank you, Mr. Chairman.

Mr. SCHEUER. Thank you very much. This has been a very interesting panel.

We would now like to ask the panel representing the Battery Consortium to come to the table: Dr. William Powers, Mr. Ken Baker, and Mr. Bob Davis.

You heard we're going to be operating strictly on the five-minute principle, but your testimony will be printed in full as you have prepared it and will be inserted in the record at the point you testify.

Let's hear from Dr. William F. Powers, Executive Director of the Research Staff at the Ford Motor Company.

We're happy to have you, Dr. Powers, and looking forward to hearing. Please proceed for five minutes.

STATEMENT OF WILLIAM F. POWERS, EXECUTIVE DIRECTOR, RESEARCH STAFF, FORD MOTOR COMPANY, DEARBORN, MICHIGAN

Dr. POWERS. Thank you, Mr. Chairman.

My name is Bill Powers, Executive Director of the Research Staff at Ford Motor Company.

Ford appreciates this opportunity to appear before the committee to review the status of our electric vehicle development and to offer comments on H.R. 1538.

Ford has been actively involved in the development of electric vehicle technologies for more than ten years. Recently we embarked with the Department of Energy and General Electric on a modular electric vehicle program called the MEVP.

The goal of the MEVP program is to develop the technology that would allow manufacturers to mass produce certain electric vehicle components at lower cost, a major step in commercial product development.

In late 1992, Ford is planning to build an international research and demonstration fleet of 70 to 100 electric vehicles to gain operating experience before going into large- scale production.

Because electric vehicles represent the most radical change in automotive propulsion in the industry's history, it is critical to perfect the technology before it is offered for sale to the general public. To help accomplish this task, Ford has established a dedi-

cated organization with cross- functional capability from all areas of the company.

Our demonstration vehicles will be based on the European Escort van modified to accommodate the MEVP powertrain and associated systems, including an advanced, high-energy, sodium/sulfur battery which was invented by ford in 1965. The demonstration vehicles will have a target range of 100 miles on the Federal urban driving schedule, a 0 to 50 speed of 14 seconds, a recharge time of 6 hours, and an optional electric air conditioning system.

In addition to the new powertrain components and batteries, manufacturers also must develop new climate control, electric power steering, and regenerative braking systems for these vehicles. Each of these systems must be highly efficient to limit battery drain, and each must be tuned to be responsive to customer expectations.

The demonstration fleet will help us gain experience with these new designs and hopefully help resolve many of the technical issues, including durability, reliability, and serviceability.

Assuming we are able to resolve the technical issues, there still are a number of inherent disadvantages associated with electric vehicles that will limit commercial acceptance. First, the driving range of an electric vehicle is limited to little more than 100 miles, whereas IC kind of technology is on the order of 375 miles.

Mr. SCHEUER. I take it you mean the driving range before recharging the battery?

Dr. POWERS. Right.

Mr. SCHEUER. Not driving range before the car self destructs or some other—

Dr. POWERS. No, no, no. Right.

Second, refueling. It takes hours to recharge vehicle batteries, whereas most gasoline tanks can be refilled in less than five minutes.

Third, performance and payload. Manufacturers can design an electric vehicle with performance comparable to gasoline- powered vehicles, but at a significantly reduced payload. The challenge for us is to develop a vehicle that offers adequate performance while still providing sufficient functionality to meet a wide range of consumer needs.

Finally, cost. Present technology batteries, which are expected to cost on the order of $5,000—and that number depends on the size of the battery, of course—can only be recharged about 500 times before they must be replaced.

Turning now to the bill, in general Ford supports the bill. We would offer the following comments on some of the legislation's key provisions:

Ford strongly supports the provision that would provide funding for multi-year research projects to develop electric vehicle technology. Such funding could help ensure that sufficient resources are available for electric battery research, a critical element of any electric vehicle program. The United States Advanced Battery Consortium formed earlier this year by Ford, Chrysler, and GM, is one such program that could benefit.

H.R. 1538 also would provide funding to help States analyze and develop incentive programs for electric vehicle utilization and to

help offset the difference between the purchase price of electric and gasoline-powered vehicles. We believe government incentives rather than just private sector support are appropriate because all of society stands to benefit from this technology.

Based on our experience, it will require major incentives to get significant numbers of these vehicles on the road. For example, propping up sales of gasoline-powered small cars at today's low gasoline prices has required thousand-dollar incentives and below-inflation pricing.

In summary, Ford believes that electric vehicles have a role to play in the future, both for environmental and electric reasons. We plan to continue our research and engineering efforts, and we hope the government will take steps to create the environment that will allow this technology to become commercially viable.

Thank you for your attention.

[The prepared statement of Dr. Powers follows:]

Statement of William F. Powers
Executive Director, Research Staff
Ford Motor Company
Before the House Science, Space and Technology
Subcommittee on the Environment
May 16, 1991

Mr. Chairman, my name is Bill Powers, executive director of Ford Motor Company's Research Staff. Ford appreciates the opportunity to appear before this committee to review the status of our electric vehicle development and the potential for the commercialization of this technology. I also would like to comment briefly on H.R.1538, the National Electric Vehicle Act of 1991.

Ford has been actively involved in the development of electric vehicle technologies for more than ten years. Since 1982, we have been a major participant in joint research programs -- the ETX I and ETX II -- with the U.S. Department of Energy (DOE), General Electric (GE) and several battery manufacturers. Building upon our successes with these programs, we recently embarked with DOE and GE on a Modular Electric Vehicle Program (MEVP). The goal of the MEVP program is to develop the technology that would allow manufacturers to mass produce certain electric vehicle components at lower cost, a major step in commercial product development.

The MEVP calls for delivery of three electric vehicle powertrains, using modular components for the propulsion system. The powertrains will be integrated into three separate vehicles: 1) a two-seater small passenger car, 2) a subcompact van and 3) a Ford Aerostar. The MEVP development vehicles will be designed to permit acceleration from zero to 50 miles per hour in less than 18 seconds and a top speed of 70 miles per hour.

In late 1992, Ford is planning to build an international research and demonstration fleet of 70 to 100 electric vehicles to gain operating experience before going into large-scale production. Because electric vehicles represent the most radical change in automotive propulsion in the industry's history, it is critical to perfect the technology before it is offered for sale to the general public. To help accomplish this task, Ford has established a

dedicated organization with cross-functional capability from all areas of the company.

Our demonstration vehicles will be based on the European Escort van, modified to accommodate the MEVP powertrain and associated systems -- including the electric motor, single speed transaxle, electronic controls and battery packs. A small number of these vehicles will be "hybrids" -- i.e., vehicles equipped with small gasoline-powered auxiliary engines. Hybrids offer the potential of extended driving range at very low emission levels. All of the demonstration vehicles will use an advanced, high-energy sodium sulfur battery, which Ford invented in 1965. The Ford electric demonstration vehicle will have a target range of 100 miles on the Federal Urban Driving Schedule (FUDS), a zero-to-50 speed of 14 seconds, a recharge time of six hours and an optional electric air conditioning system.

In addition to the new powertrain components and batteries, manufacturers also must develop new climate control, electric power steering and regenerative braking systems for these vehicles. Each of these systems must be highly efficient to limit the drain on the battery and each must be tuned to be responsive to customer expectations. The demonstration fleet will help us gain experience with these new designs and hopefully help resolve many of the technical issues, including the durability, reliability and serviceability of electric vehicle components and batteries. To date, there just have not been enough electric vehicles in service to enable Ford or any other manufacturer to conclude that this technology can stand up to every-day use.

We presently are negotiating with several different state and federal agencies, and a number of utilities, to include these vehicles in their fleets under a lease agreement for two to four years. We intend to place these vehicles in a wide variety of locations to gain experience under different operating and climatic conditions.

Assuming we are able to resolve the technical issues, there still are a

number of inherent disadvantages associated with electric vehicles that will limit commercial acceptance. Our market research indicates that consumers are interested in the environmental and energy diversification benefits that electric vehicles could provide, but they have fundamental concerns with electric vehicle technology:

Driving Range. Today, a typical gasoline-powered vehicle equipped with a 15 gallon fuel tank has a driving range of about 375 miles. By comparison, the driving range of an electric vehicle is limited to little more than 100 miles -- less than one-third the distance.

Refueling. In addition to more frequent refueling requirements, the amount of time it takes to recharge an electric vehicle is significantly greater than the time required to refill a gasoline tank. Presently, it takes hours to recharge vehicle batteries whereas most gasoline tanks can be refilled in less than five minutes. We also believe that convenient availability of battery recharging facilities will be important.

Performance/Payload. It is a simple law of physics that vehicle performance and payload are inextricably linked to one another. Manufacturers can design an electric vehicle with performance comparable to gasoline-powered vehicles but it reduces the amount of load that can be carried by the vehicle. In addition, higher operating speeds rapidly wear the batteries down -- leading to the need for more frequent recharging. The challenge for manufacturers is to develop a vehicle that offers adequate performance while still providing sufficient functionality to meet a wide range of consumer needs.

Cost. The initial and replacement costs of batteries are expected to be significant. Present technology batteries can only be recharged about 500 times -- for a maximum useful life of about 30,000 miles -- before they must be replaced. Replacement costs are estimated to be on the order of $5,000. One possible way to reduce the costs associated with batteries is

for electric utilities to own the batteries and lease them to the operator. Payment for leasing the batteries and the electricity to charge them would then be billed to electric vehicle owners on their utility bills. Some or all of the costs could be spread to all utility customers on the basis that the environmental benefits of electric vehicles would accrue to the general population.

Turning now to H.R.1538. In general, Ford supports the bill; we would offer the following comments on some of the legislation's key provisions:

Ford strongly supports the provision that would provide funding for multi-year research projects to develop electric vehicle technology. Such funding is an appropriate role for government and should help industry remain competitive in the development of electric vehicle technology.

It also could help ensure that sufficient resources are available for electric battery research, the critical element of any electric vehicle program. The United States Advanced Battery Consortium (USABC), formed earlier this year by Ford, GM and Chrysler, is one such program that could benefit. The goal of USABC is to pursue research and development of advanced energy systems capable of providing future generations of electric vehicles with significantly increased range and performance. USABC research and development efforts are pointed toward two major programs: 1) development of a mid-term battery, with all design, development and prototype pilot production work completed by 1994 and 2) demonstration of concept feasibility in 1994 for a long-term battery. The Consortium is actively soliciting proposals from battery developers and manufacturers -- to date, about 30 proposals have been received. In addition, USABC is working with DOE to coordinate industrial and government approaches to research and development.

H.R.1538 also would provide funding to help states analyze and develop incentive programs for electric vehicle utilization and $50 million over a ten-year period to help offset the difference between the purchase price of

electric and gasoline-powered vehicles. We believe government incentives -- rather than just private sector support -- are appropriate because all of society stands to benefit from this technology.

Based on our experience, it will require major incentives to overcome the disadvantages of electric vehicles to consumers and get significant numbers of these vehicles on the road. For example, propping up sales of gasoline-powered small cars at today's low gasoline prices has required $1,000 incentives and below-inflation pricing. Some of the incentives worth consideration include tax credits, favorable registration and licensing fees, preferential parking and exclusive access to certain urban areas. Ford would be pleased to work with the committee to develop cost-effective, fair incentive policies.

Ford believes that electric vehicles have a role to play in the future -- both for environmental and energy reasons. We plan to continue our research and engineering efforts and we hope that government will take steps to create the environment that will allow this technology to become commercially viable.

This concludes my prepared testimony. I would be happy to answer any questions that you might have.

Mr. SCHEUER. Thank you very much, Dr. Powers.

Now we'll hear from Mr. Ken Baker, Manager of the Electric Vehicle Program at General Motors.

Mr. Baker?

STATEMENT OF KEN BAKER, MANAGER, ELECTRIC VEHICLE PROGRAM, GENERAL MOTORS CORPORATION, WARREN, MICHIGAN

Mr. BAKER. Thank you, Mr. Chairman, and good morning.

My name is Ken Baker, and I am Program Manager of the Electric Vehicles at General Motors Corporation. I also serve as chairman of the United States Advanced Battery Consortium, but I am speaking today on behalf of General Motors.

The legislation you are considering today, H.R. 1538, is most encouraging because it recognizes that the challenge of commercializing electric vehicle technology is a systems problem that will require work in the areas of propulsion and other vehicle technologies and infrastructure. Development of GM electric vehicles has been proceeding since we unveiled the prototype, and we recently have announced plans to produce the car in the mid 1990s at an existing GM facility in Lansing, Michigan.

The first prototype of those cars, which you know as Impact, accelerates faster than some top foreign sports cars has a top-speed governed at 75 miles an hour, and has a fully- discharged range of up to 120 miles. I am submitting for the record additional details about the vehicle's performance characteristics that support our conviction that electric vehicles can be developed into a viable mode of personal transportation, one that has no vehicle emissions and does not rely on petroleum.

And electric vehicle technology has another important feature, as well. As envisioned by General Motors, it would utilize the North American industrial base as a center for global production and distribution.

As confident as we are about the future of electric vehicles, there is a big difference between technical readiness and commercial viability. For example, the prototype I described earlier has a fully-discharged range of 120 miles available. But, just as we would not want to run an internal combustion engine to empty, the car's useful range is more likely to be between 80 and 100 miles. H.R. 1538 recognizes the importance of overcoming these differences between the laboratory and the real world, between prototypes and mass production, and proposes ways the government can accelerate progress in this area.

The primary difficulties in achieving general market acceptance of electric vehicles at their current level of technology are their ability to meet broad customer expectations for range, time to recharge, and cost of ownership. To address these issues, research and development is needed in the areas of advanced batteries and vehicle efficiency.

In January of this year, in consultation with the United States Department of Energy, GM, Ford, and Chrysler formed a consortium to evaluate and develop advanced battery technologies in a cost-efficient, focused manner. The objective of the consortium is to

develop production-feasible batteries that can make electric vehicles competitive with gasoline-powered vehicles by offering greater range, more power, longer battery life, and shorter charging times.

Since January we have submitted a proposal to the Department of Energy inviting Federal support and participation in this consortium. We believe that the proposal is consistent with the objectives of Title one of this legislation.

In addition to the advanced battery development, work needs to be done on vehicle efficiency. GM's electric vehicle program includes development of high-efficiency propulsion systems, lightweight body structures, improved aerodynamics, and low-rolling resistance tires. We support Title one's inclusion of funding for research and development in these critical areas, as well. We also encourage you to consider ways of ensuring that the infrastructure improvements and prototype demonstrations envisioned in Titles two and three do not disadvantage newly-designed ground up vehicles like the Impact which can be more expensive to produce than conversions but which offer the greatest promise of electric efficiency and customer satisfaction.

Developing an electric car that is technically feasible is only part of the equation. We also need to get the market ready for the electric car. Title three of H.R. 1538 logically includes support for efforts to create an environment for electric cars that accommodates the unique support needs.

Electric vehicles today generally are technically feasible, and prototype demonstrations are hardly needed to prove that. The need is to demonstrate compatibility between these vehicles and the infrastructure that will service, maintain, and otherwise support them. That is why we fully support titie two's restriction on funding demonstration projects such as requiring a minimum number of vehicles and considering the ability of the manufacturer to support those vehicles and parts and service.

To achieve significant improvements in air quality and meaningful improvements in energy efficiency, we need to develop a large market for electric vehicles and a complete customer support system based on real cars from a real company. Demonstrations conducted with inappropriate vehicle technologies or in the absence of suitable infrastructure could be misleading and might create negative public perceptions about the performance, convenience, and suitability of electric vehicles.

Title two of the legislation also suggests ways to offset the price disadvantage that purchasers and demonstration programs will face at today's level of battery technology. In addition to the initial purchase price disadvantage, the lead acid batteries we intend to use to make the first generation of electric vehicles a near-term reality would require replacement every 20,000 miles, further increasing the cost of ownership.

Let me emphasize we are not seeking long-term subsidies for this business; we are looking to advance battery technology to extend battery life, reduce cost of ownership, and make electric vehicles a good buy for the customer and good business for us—one with global potential.

Thank you very much for your attention and your time. I would be happy to try to answer any questions you may have.

[The prepared statement of Mr. Baker follows:]

STATEMENT OF

GENERAL MOTORS CORPORATION

TO A

JOINT HEARING

OF THE

SUBCOMMITTEE ON THE ENVIRONMENT

AND

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

PRESENTED BY

KENNETH R. BAKER

MAY 16, 1991

WASHINGTON, D.C.

Thank you, Mr. Chairman, and good morning. My name is Ken Baker, and I am program manager of electric vehicles at General Motors Corporation. I serve as chairman of the U.S. Advanced Battery Consortium, but I am speaking today on behalf of GM. We appreciate this opportunity to discuss our development of electric vehicles, and explore how the federal government can best support work in this area.

The legislation you are considering today, H.R. 1538, is most encouraging because it recognizes that the challenge of commercializing electric vehicle technology is a systems problem. It requires a congruence of developments in the areas of propulsion and other vehicle technologies, infrastructure and the customer -- all of which are addressed in this bill.

Last fall we had the opportunity to present details of our electric vehicle prototype to the House Subcommittee on Transportation, Aviation and Materials, whi h shares your interest in this important technology. At that time we described a specifically designed electric vehicle that we had engineered from the ground up to optimize mechanical, electrical and aerodynamic efficiency. GM believes broad public acceptance of electric vehicles depends on their being perceived as real cars that meet customer requirements. We feel the Impact with its aerodynamic styling, performance, range, safety, comfort and convenience features is designed to such requirements.

Development of the GM electric vehicle has been proceeding since we unveiled the prototype, and we recently have announced plans to produce the car in the mid-1990s at an existing GM facility in Lansing, Michigan.

The first prototype of those cars, which you know as Impact, accelerates faster than some top foreign sports cars, has a top speed governed at 75 mph, and has a "fully-discharged" range of up to 120 miles. I am submitting for the record additional details about the vehicle's performance characteristics that support our conviction that electric vehicles can be developed into a viable mode of personal transportation -- one that has no vehicle emissions and does not rely on petroleum. And electric vehicle technology has another important feature: as envisioned at General Motors, it would utilize the North American industrial base as a center for global production and distribution.

The Impact is just one example of GM's alternative fuel programs. Although GM expects fossil fuel-dependent vehicles to dominate the national fleet for the next 10 to 15 years, we are actively developing a variety of vehicles that run on fuels other than gasoline. We are working with a gas industry consortium to engineer and develop light-and medium-duty trucks that run optimally on natural gas, for sale in the mid-1990s. GM is supplying more than 2,000 methanol-fueled Chevrolets for a demonstration program in California. And we have aggressive research and development programs in two-stroke engines and fuel cells. All of these programs reflect GM's continuing commitment to promote the efficient use of energy.

But no alternate fuel program has captured the American imagination quite the way the electric car has. That high level of public interest is reflected in the National Electric Vehicle Act that you are considering today.

3

As confident as we are about the future of electric vehicles, there is a big difference between technical readiness and commercial viability. For example, the prototype I described earlier has a fully-discharged range of 120 miles available. But just as we would not want to run an internal combustion engine to empty, the car's useful range is more likely to be between 80 to 100 miles. H.R. 1538 recognizes the importance of overcoming these differences between the laboratory and the real world, between prototypes and mass production, and proposes ways the government can accelerate progress in this area. We welcome your committee's invitation to comment on those strategies, because while there is still a lot to learn, GM's work to bring this car to market is bringing us face-to-face with a number of real-world challenges.

The primary difficulties in achieving general market acceptance of electric vehicles at the current level of technology are their ability to meet customer expectations for range, the time they take to recharge, and their high cost of ownership. To address these issues, research and development is needed in the areas of advanced batteries and vehicle efficiency.

In January of this year, in consultation with the U.S. Department of Energy, GM, Ford and Chrysler formed a consortium to evaluate and develop advanced battery technologies in a cost-efficient manner. The objective of the consortium is to develop production-feasible batteries that can make the cost of ownership of electric vehicles competitive with gasoline-powered vehicles by offering greater range, more power, longer battery life and shorter charging times. Since January, we have submitted a proposal to the Department of Energy

inviting federal support and participation in the consortium. We believe that proposal is consistent with the objectives of Title I of this legislation.

In addition to advanced battery development, work needs to be done on vehicle efficiency. GM's electric vehicle program includes development of high-efficiency propulsion systems, light-weight-body structures, improved aerodynamics, and low-rolling resistance tires. We support Title I's inclusion of funding for research and development in these areas.

We also encourage you to consider ways of insuring that the infrastructure improvements and prototype demonstrations envisioned in Titles II and III do not disadvantage newly designed, "ground-up" vehicles like Impact, which can be more expensive to produce than conversions, but which offer the greatest promise of improved energy efficiency and customer satisfaction.

Developing an electric car that is technically feasible is only part of the equation. We also need to get the market ready for the electric car. Title III of H.R. 1538 logically includes support for efforts to create an environment for electric cars that accommodates their unique support needs. Electric vehicles today generally are technically feasible, and prototype demonstrations are hardly needed to prove that. The need is to demonstrate compatibility between these vehicles and the infrastructure that will service, maintain and otherwise support them. That is why we fully support Title II's restrictions on funding demonstration projects, such as requiring a minimum number of vehicles, and considering the ability of the manufacturer to support those vehicles with parts and service.

To achieve significant improvements in air quality and meaningful improvements in energy efficiency, we need to develop a large market for ground-up electric cars and a complete customer support system — based on real cars from a real car company. Demonstrations conducted with inappropriate vehicle technologies or in the absence of a suitable infrastructure could be misleading, and might create negative public perceptions about the performance, convenience and practicability of electric cars.

Title II of the legislation also suggests ways to offset the price disadvantage that purchasers in demonstration programs will face at today's level of battery technology. In addition to an initial purchase price disadvantage, the lead-acid batteries we intend to use to make a first generation of electric vehicles a near-term realty would require replacement every 20,000 miles — further increasing cost of ownership. Title III addresses the cost issue by encouraging states and cities to offer special market incentives for electric vehicles, access to high-occupancy-vehicle lanes and preferred parking. Let me emphasize that we are not seeking long-term subsidies for this business. We are looking to advanced battery technology to extend battery life, reduce cost of ownership, and make electric vehicles a good buy for the customer and a good business for us — one with global potential. H.R. 1538's incentives offer a way of helping early producers and their customers face the temporary challenges associated with low-volume production and high life-cycle cost. Such incentives will help stimulate technological development and build market confidence.

6

We are at the threshold of an important shift in personal transportation in this country. Through the electric vehicle program, alternate fuel efforts, and intelliegent vehicle highway systems research GM is making a significant contribution to that transition. But we cannot accomplish it by ourselves. H.R. 1538 outlines a number of ways the federal government can support this shift — and there may be additional ways.

Thank you for your attention and your time. I would be happy to try to answer any questions you may have.

Mr. SCHEUER. We will now hear from Mr. Davis, Executive Engineer, Special Projects Engineering Office of Chrysler Corporation. Mr. Davis?

STATEMENT OF ROBERT L. DAVIS, EXECUTIVE ENGINEER, SPECIAL PROJECTS ENGINEERING OFFICE, CHRYSLER CORPORATION, HIGHLAND PARK, MICHIGAN

Mr. DAVIS. Thank you, and good morning.

I am Robert Davis, Executive Engineer in the Special Projects Engineering Office of Chrysler Corporation. I am in charge of the electric vehicle program for Chrysler.

Chrysler appreciates the opportunity to express our views regarding House rule 1538, the National Electric Vehicle Act.

As concerns deepen over our country's electric consumption patterns and increased dependence on foreign oil, there is a need to explore a variety of alternate fuels, including methanol, ethanol, compressed natural gas, and electric vehicles.

Last September in my testimony I said that the key to success of an electric vehicle would be a breakthrough in battery technology. Since that time, Chrysler announced in early January that we had signed a 28-month agreement with the Electric Power Research Institute to engineer and develop an electric-powered Chrysler mini van for possible commercial production. We also announced on January 31 that we had formed a research consortium called the United States Advanced Battery Consortium with Ford and General Motors to evaluate and develop advanced battery technologies for use in electric vehicles.

This consortium plans to work with the Electric Power Research Institute, the electric utility industry in the United States, and the U.S. Department of Energy in developing the program to find the breakthrough in battery technology needed to make electric cars viable.

Our specific comments on House rule 1538 are as follows:

Title one. The proposed bill would provide authority for the Department of Energy to develop a cooperative program in a wide range of technical areas, including electric motor controllers, lightweight body structures, as well as battery research.

As I said earlier, at this time Chrysler believes that battery research is the single key to moving beyond the present plateau in providing electric vehicles in large quantities to the marketplace. All other elements of electric vehicle development are within the development capabilities of competing vehicle manufacturers and are not in need of special cooperative government-sponsored programs.

Chrysler believes that the United States Advanced Battery Consortium is taking the right approach in focusing scarce resources on the most promising solutions to the critical electric vehicle problem, the battery. We are cooperating with the Administration under existing legislative authority and are not sure that additional legislation is necessary for this program to be successful.

Title two. Assuming success in our engineering activity for the electric-powered mini van, Chrysler could introduce a small test fleet in 1994. We believe that the National Electric Vehicle Act of

1991 would be extremely helpful in underwriting the high cost of these initial vehicles; however, the funding proposed in House rule 1538, while substantial and important, will not result in electric vehicle sales in huge quantities.

Today the General Motors G van is the only available electric vehicle for sale on the marketplace. The G van sells for $55,000 against the equivalent gasoline engine van of $15,000. The cost differential of $40,000 per vehicle with proposed spending of $5 million per year would result in 125 G vans per year.

These are vehicles with commercially-available lead acid batteries which cost several thousand dollars per pack. Vehicles using advanced batteries such as the nickel iron batteries that Chrysler is using in the TE van cost over $60,000 per pack. The proposed funding level could result in funding for less than 50 vehicles per year.

These subsidies, however well intended and of value to encourage near-term purchase of electric vehicles, could send the wrong signal to potential customers regarding the final cost of electric vehicles. As we said last September, we still believe the final cost of electric vehicles to the consumer will be 30 to 50 percent higher than the equivalent gasoline-powered vehicle.

On title three, Chrysler offers a note of caution in development of infrastructure concepts to support an electric vehicle market. It is important that these developments look beyond today's lead acid battery technology and be responsive to emerging battery developments which could result in substantial changes in assumptions as to infrastructure requirements and operations.

I thank you for this opportunity to provide Chrysler's comments and would be pleased to answer any questions.

[The prepared statement of Mr. Davis follows:]

Statement of Robert L. Davis
Executive Engineer - Special Projects Engineering Office
Chrysler Corporation

Before the House Committee on Science, Space and Technology
Subcommittee on Environment
May 16, 1991

Subject: National Electric Vehicle Act of 1991

Thank you and good morning. I am Robert Davis, Executive Engineer in the Special Projects Engineering office of Chrysler Corporation. I am in charge of the electric vehicle program for Chrysler. Chrysler appreciates the opportunity to express our views concerning H.R. 1538, the National Electric Vehicle Act. As concerns deepen over our country's energy consumption patterns and increased dependence on foreign oil, there is a need to explore a variety of alternate fuels, including methanol, ethanol, compressed natural gas and electric vehicles.

Last September in my testimony I said that "the key to success of an electric vehicle would be a breakthrough in battery technology." Since that time, Chrysler announced in early January that we had signed a 28-month agreement with the Electric Power Research Institute (EPRI) to engineer and develop an electric-powered Chrysler minivan for possible commercial production. We also announced on January 31, 1991 that we had formed a research consortium called the United States Advanced Battery Consortium with Ford and General Motors to evaluate and develop advanced battery technologies for use in electric

vehicles. This Consortium plans to work with the electric utility industry in the United States, the Electric Power Research Institute (EPRI) and the U.S. Department of Energy in developing the program to find the breakthrough in battery technology needed to make electric vehicles viable.

Our specific comments on H.R. 1538 are as follows:

TITLE I

Electric Vehicle and Battery Research and Development Program

The proposed bill would provide authority for DOE to develop cooperative programs in a wide range of technical areas, including electric motor controllers, light-weight body structures, as well as for battery research. As I said earlier, at this time Chrysler believes that battery research is the single key to moving beyond the present plateau in providing electric vehicles in large quantities to the marketplace. All other elements of electric vehicle development are within the development capabilities of competing vehicle manufacturers and are not in need of special cooperative government-sponsored programs.

Chrysler believes that the USABC Battery Consortium is taking the right approach in focusing scarce resources on the most promising solutions to the critical electric vehicle

problem -- the battery. We are cooperating with the Administration under existing legislative authority and are not sure that additional legislation is necessary for this program to be successful.

TITLE II

Electric Vehicle Commercial Demonstration Program

Assuming success in our engineering activity for the electric-powered minivan, Chrysler could introduce a small test fleet in 1994. We believe that the National Electric Vehicle Act of 1991 would be extremely helpful in underwriting the high cost of these initial vehicles. However, the funding proposed in H.R. 1538, while substantial and important, will not result in electric vehicle sales in huge quantities.

Today the General Motors G-Van is the only available electric vehicle for sale in the marketplace. The G-Van sells for $55,000 against the equivalent gasoline-engined van of $15,000. The cost differential of $40,000 per vehicle, with proposed spending of $5 million per year, would result in 125 G-Vans per year. These are vehicles with commercially available lead-acid batteries, which cost several thousand dollars per pack. Vehicles using advanced batteries, such as the nickel-iron batteries that Chrysler is using in the TEVan, cost over $60,000

per pack. The proposed funding level could result in funding for less than 50 vehicles per year.

These subsidies, however well intentioned and of value to encourage near-term purchase of electric vehicles, could send the wrong signal to potential customers regarding the final cost of electric vehicles. As we said last September, we still believe the final cost of an electric vehicle to the consumer will be 30% to 50% higher than the equivalent gasoline-powered vehicle.

TITLE III

Electric Vehicle Infrastructure Development Program

Chrysler offers a note of caution in the development of infrastructure concepts to support an electric vehicle market. It is important that these developments look beyond today's lead-acid battery technology and be responsive to emerging battery developments which could result in substantial changes in assumption as to infrastructure requirements and operations.

I thank you for this opportunity to provide Chrysler's comments and would be pleased to answer any questions.

###

Mr. SCHEUER. Thank you very much.

I'll ask this question to the whole panel. Have market surveys been done as to what the potential market is out there, not only domestically but around the world in London, Paris, Rome, Athens, Tokyo, and so forth, because there has been a great deal more attention around the world for the need by governments around the world, as well as by non- governmental bodies. A great deal more attention has been focused on the need to reduce fossil fuel consumption and lower the impact on greenhouse gases, global warming, acid rain, and so forth. They've been working very hard on doing this from a variety of viewpoints.

Have any estimates been made as to the potential market out there for cars at the price that you have indicated for 150, but, much, much more important, at the price that you could afford to sell them at and make a reasonable profit if you produced 100,000 cars a year or 1 million cars a year? Anybody?

Mr. BAKER. Mr. Chairman, if I could—Ken Baker from General Motors—

Mr. SCHEUER. Yes, indeed.

Mr. BAKER. A perspective that I would offer is the energy and environmental issue is one of global significance, as you point out, and the marketplace is recognizing that significance. They are very interested in products that can contribute to that concern.

Mr. SCHEUER. Mr. Baker, let me just focus this a little because we are very short of time. We know that the marketplace is interested. We know that there has been attention—great attention—overseas to reducing fossil fuel consumption. What I am asking you is: is there a market for 100,000 cars a year? Let's say abroad, 500,000, 1 million, 50,000? What is the market?

Mr. BAKER. I think it is very uncertain to predict the market at this point. The key issue is credible, acceptable alternatives in the marketplace that provides the consumer with an alternative.

There is no question that there is an interest and motivation in a market that can be built upon internationally in North America as well as overseas.

Mr. SCHEUER. Can you give us a number?

Mr. BAKER. I don't believe that a number could be really developed at this point. I think there is tremendous opportunity. Certainly the ZEV requirement in California establishes kind of a minimum level that we are all going to have to deal with.

Mr. SCHEUER. And that requirements is likely to be adapted by other States—

Mr. BAKER. Right.

Mr. SCHEUER.—as has the trend been.

Mr. BAKER. That could a minimum, and then there is certainly upside potential to that, depending really on the relevance and credibility of the products that are introduced.

Mr. SCHEUER. It seems to me that the concept of a non- fossil fuel-powered car creates an enormous market around the world. If that is true, and if it is true that the Justice Department has permitted the three automobile companies to work together on research, and if it is true, as the automobile industry executive told 40 Members of Congress a week or two ago out in Detroit, that the industry is in the most dire straits with needs to raise $80 billion of

capital in the next three or four months, and I think $400 billion of capital in the next few years, then would it be true that we ought to take a fresh look at the economies that could be obtained in the industry if the three firms that are working together to produce the battery would be permitted by the Justice Department and Congress to work together on the design of the car, the manufacturing of the car, and the merchandising of the car?

Would it be helpful to your companies if we suspended the operation of the antitrust law where there promised to be real competition in any event, enabling Chrysler, who now joint ventures with Mitsubishi, to joint venture perhaps with Ford and General Motors? To enable Ford, that now joint ventures with Mazda, to joint venture with Chrysler and General Motors? To enable General Motors, that joint ventures with three or four major automobile companies in Japan, to joint venture with Chrysler and Ford?

It seems to me anomalous that each of our major automobile companies has joint ventures with other car manufacturers in Japan, but our government prohibits them from cooperating with each other and joint venturing with each other.

Now, that may have been appropriate 100 years ago when the antitrust laws were passed when we were concerned with domestic competition and we were concerned with trying to prevent another John D. Rockefeller from destroying or gobbling up every competitor in sight. But the main question today is not whether we will have four automobile manufacturing companies or three, or three or two. The question is: will we have any automobile manufacturing company that can compete in what is now a global market?

One has to ask the question. Is American automobile manufacturing going to go the way of VCR manufacturing in America or television set manufacturing, color television tube manufacturing in America? It has happened throughout the field of consumer electronics, just to mention one industry. It could happen to the automobile industry. We don't want it to happen to the automobile industry.

One out of every seven manufacturing jobs I'm told in this country—and they are highway shops, for the most part — come from the automobile industry. We care about the automobile industry.

Would it help in its survival if Ford, General Motors, and Chrysler could not only do research together, but design, manufacture, and sell in a global marketplace in joint ventures together of their own design and of their own choosing? Would that help them in this particular case achieve economies of scale flowing from joint use of technical staff, manufacturing capability, sales capability, design capability? Would that help them achieve a quality car at a price that would find a vast market overseas, as well as at home?

Mr. POWERS. Can I venture a partial answer?

Mr. SCHEUER. Please do.

Mr. POWERS. I think the one theme that comes from all of our testimonies is that a viable battery still does not exist. That is what is crucial. The new laws on allowing us to cooperate do allow us to work on the battery, which is still in a research stage. We have batteries, of course, that can be developed, but none of them are what we consider near optimal for cost, range, and so on, that the

customer will ultimately accept compared to the internal combustion engine.

I think it is a whole separate issue whether antitrust would help us, but I'm not sure it would help us on the battery. I think the USABC is already—we're very together on doing what we think is necessary there.

Mr. SCHEUER. I'm talking about the design, manufacture, and sale of the whole car.

Mr. POWERS. The battery is the element that's missing. We know, I think—

Mr. SCHEUER. But we are going to have a battery, are we not, by 1994? If there's a little slippage, it will be a little bit later, but these three great firms are going to produce a viable battery, are they not?

Mr. POWERS. That is not a given, in my opinion. Would you like to comment?

Mr. SCHEUER. Why are we putting all this money in it?

Mr. POWERS. Because it is still research. We are trying—we have, if you remember, in the USABC there are two levels of batteries that we talk about: one that in the 1994 to 1995 time frame we'll be able to definitely have a design and a means of manufacturing that will get you on the order of 100-mile range, which we still don't think the customer will accept if he has an IC competitor out there with it. We hope that in that same time frame we would have a battery that's—

Mr. SCHEUER. Excuse me. What's an IC?

Mr. POWERS. I'm sorry. Internal combustion engine, gasoline engine—as a means of propulsion.

Mr. SCHEUER. Well, it might be that we are going to have to require by law some intracity fleets to move to alternative fueled vehicles. We may have to do that by law, and I think if we do it cities and countries around the world will be happy to do it. Remember, all across Europe distances are far less than they are here. You can go from one boundary of a country to its farthest boundary in not much more than 100 miles in many countries abroad. When foreigners come to this country they are absolutely awestruck by the distances involved. That's not true in France and England and Italy and so forth. One hundred miles takes you a good way, and it would be far more than our concept of intra-urban; it would be intra-urban plus the suburbs and plus a couple of nearby cities and towns, so it would fill a greater need proportionately in competition with the internal combustion machine than with a car with a 100-mile range in this country.

All right.

Mr. BAKER. Mr. Chairman, if I could, I'm—

Mr. SCHEUER. Yes.

Mr. BAKER. On the subject of the battery, I would like to address that from our point of view.

As you know, we have committed to introduce an electric vehicle with our lead acid, maintenance free battery. We feel that will provide a very acceptable limited volume introduction to get into this new form of transportation and to recognize the significance of developing the infrastructure and the systems for the consumer as

well as the manufacturer to get into this industry and to manage the progression.

The reason for the United States Advanced Battery Consortium is also to recognize two things: one, a systems approach to this electric storage issue is required, one that views the utility point of view, the infrastructure, the governmental research and capability that they can bring, the manufacturer and a battery developer. You can't do that job incrementally. The United States Advanced Battery Consortium brings those people together.

The second thing is very key with the consortium and the Title one provision, is the fact that there is no clear choice at this point for that advanced battery. The advanced battery that would provide broad-scale acceptance of EVs is a credible, meaningful, satisfying alternative to our gasoline- powered vehicles. What we need is broad-scale acceptance if we want to achieve the electric and environmental impact and the economic growth and stability that we are expecting this industry can bring.

Back to the antitrust proposal that you have made, I think it is one that we certainly are interested in. We believe that there are provisions to work together, as demonstrated with the USABC today, but we are anxious to look beyond that, because I think it is very important that we recognize that this is an arena, the energy and environmental arena, that needs to be won by America. We cannot come in second to the Asian or European manufacturers if we want to continue to expect growth and vitality in the economic base in North America through the automotive sector.

We need your help to do that and would welcome your openness to say "here are the breadth of opportunities that we would like to consider." The key bottom line is that we are here talking about it—collaboration, openness. We don't need legislation; we need collaboration. We need understanding. We need you to say, "These are some options that we would like to consider." We need to be able to respond to you in a meaningful way to say those are helpful or not.

Mr. SCHEUER. Well, we have addressed this question to you. I addressed it to a number of your top executives in Detroit. So far we haven't had any collective answers. What I'm asking you to do is to contact, through ways that are surely available to you, the CEOs of the three major corporations and have them tell us—have them write me a letter explaining what their reaction is. Would they like to be liberated from the application of the antitrust laws that were passed 100 years ago under wildly differing circumstances than the bitter, bitter international competition with which you are faced today.

There are a number of American industries that are history because they couldn't cope with that competition. We don't want the automobile industry in this country to be history. We want that industry to survive. And if working together you can create economies of scale, as well as economies of concentration of talent—design talent, manufacturing talent—we want to help you do that. And if it takes legislation, this Congress will pass that legislation, I assure you, and we will direct the Justice Department as to how they should handle this matter. We'll direct them by legislation if we can't do it more expeditiously and quickly by informal agree-

ment. And I would think that they would want this industry survive and help you in any way achieve economies of scale so that you'd be a more effective and more successful competitive source in what is demonstrably a global market.

Other industries have failed to recognize that characteristic of the market today, its globalness, and they did it at their peril and they did it at a cost of extinction for several of them. We don't want that for the automobile industry, so please get back.

When and if you do get back to me, I will immediately sit down with the Michigan delegation and we will proceed from there.

I now would like to recognize Congressman Bob Walker, the distinguished ranking minority member of this committee, for questions.

At a time when we are receiving the Queen of England, we're all a little more conscious of rank than we are normally, so—

Mr. WALKER. I don't want to move in front of people who were here before me. I think Mrs. Morella was here before me.

Mr. SCHEUER. I'd be happy to—

Mrs. MORELLA. I certainly would defer to the Ranking Member. And, I appreciate your doing that, Mr. Chairman, but I'm just going to ask a brief question and then go to my two other meetings going on simultaneously.

First of all, gentlemen, you would be pleased to know that we own three cars. And, one is a GM, one is a Ford, and one is a Chrysler. Isn't that pretty good? I won't tell you what state they're in, but—no, they're great.

Secondly, in 1974 I campaigned with an electric car. It was a GM car. I drove it through the neighborhoods. It was not too much bigger than a golf cart, but it was great fun. Nobody cared about issues. They all wanted to know when do you charge the battery, how many miles do you get, how far can you travel. It was really a fascinating kind of environmental collectiveness with the constituency.

But my experiences do indicate you've got a lot of work to do, like the battery, for instance. We couldn't get 35 miles before the battery needed recharging, and at a couple of occasions I had to stop at constituent's houses—didn't even know them—and just said, "Could I plug in?" Then it was the question about, "My God, what kind of power is she going to take from us for this vehicle?" I'd say, "It's just like a television set." But it took a lot of credibility on my part to get them to do it, and that did happen.

It also wouldn't go faster than 35 miles an hour, and if you tried uphill you got even less than that. So I thought, "What a wonderful vehicle that has been around a long time that we have done nothing much about that does need some work."

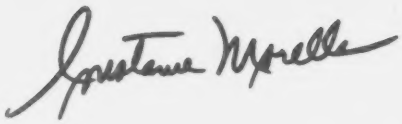
For safety also—would you not also agree not only that the weight of the battery, which is one of your problems in your time table, but even the safety factor? If you wanted to make any comments, I just wanted to make sure I let you know that I did try it out early on.

[The prepared statement of Mrs. Morella follows:]

NATIONAL ELECTRIC VEHICLE ACT OF 1991

CONGRESSWOMAN CONNIE MORELLA

MAY 16, 1991



MR. CHAIRMAN, MONTGOMERY COUNTY, MARYLAND IS AN URBAN AREA AND URBAN AIR POLLUTION CONCERNS ME QUITE A BIT. TODAY'S HEARING ON CHAIRMAN BROWN'S BILL, THE NATIONAL ELECTRIC VEHICLE ACT OF 1991, WILL EXPLORE THE BENEFITS AND PROBLEMS OF ELECTRIC VEHICLES, AND I WILL LISTEN CLOSELY.

CLEANER AIR, LESS DEPENDENCE ON FOREIGN OIL, AND MODERATION OF THE GREENHOUSE EFFECT WOULD BE THE HAPPY RESULTS FROM THE USE OF MORE ELECTRIC VEHICLES. THE COST, I BELIEVE, IS ONE OF THE PROBLEMS. BUT WE PAY A HIGH PRICE FOR OUR HEAVY USE OF PETROLEUM.

WE HAVE A DISTINGUISHED GROUP OF WITNESSES WHO WILL SPARK OUR INTEREST IN PROGRAMS AT THE DEPARTMENT OF ENERGY AND THE U.S. ADVANCED BATTERY CONSORTIUM. GENERAL MOTORS, FORD, AND CHRYSLER WANT TO DEVELOP A COST EFFECTIVE ELECTRIC VEHICLE WITH A LONGER LIFE TIME THAN 20,000 MILES. I LOOK FORWARD, MR. CHAIRMAN, TO HEARING FROM ALL OUR WITNESSES. IF WE CAN DECREASE THE WEIGHT OF THE BATTERIES, ELECTRIC VEHICLES ARE A PART OF OUR FUTURE TRANSPORTATION OPTIONS, AND I SUPPORT THEIR SPEEDY DEVELOPMENT.

Mr. BAKER. Mrs. Morella, I'd like to comment that electric vehicle technology at General Motors has progressed substantially since that time, but I think it is important to recognize that's also part of the reason that we did the concept car Impact—to show objectively that technology had progressed and that it could be good, clean fun, as you pointed out.

I think, though, that there are certainly a lot of challenges that we face, as you pointed out, in bringing the car to market in volume and to develop the market together so that it is a credible, viable alternative. But we have progressed substantially, and we'd be anxious to be able to show that to you at some point.

Mrs. MORELLA. You do need an education factor very much involved in it.

Finally, are there not some European cities where, within the confines of the city, they use and have been using electric vehicles?

Mr. BAKER. In fact, some European cities—in Italy, in particular—are limiting the use of gasoline-powered vehicles within the city limits and limiting the choices that are available beyond that.

Mr. SCHEUER. Let me—will my colleague yield momentarily?

Mrs. MORELLA. Yes, indeed.

Mr. SCHEUER. I rode around Italy last summer during our recess on vacation with my wife and we had a tiny little car, and I went into cardiac arrest when I pulled into the gas station for the first time and paid $80 for a tankful of gas. So you are going to find that the competitive characteristic of the electric car is going to be greatly heightened around the world where people regularly in almost all the developed countries pay roughly $4.50 to $5 for a tank of gas [sic]. This is going to concentrate their minds on the economies of an electric car.

Mrs. MORELLA. Thank you. That's very interesting. Isn't it also that you're really working on a car that is going to be a second car, because they're still going to want to get out on that beltway. And, they're going to go on their long trips and they want safe—not that that won't be safe, but they want a car that is going to accelerate more, whatever, they don't have exigencies to worry about. So, you're dealing with the in-city car. Is that—do you see it that way?

Mr. BAKER. More of the urban use environment initially because of the capability of the battery and the efficiency of conversion of that battery energy to range, largely.

Several people have commented on the performance of our Impact concept car, and I think it is very important to recognize that the reason the performance is in the car—and it outperforms several cars with 0 to 60 in 8 seconds—is to provide the sense of confidence and control of driving that vehicle in all the urban environment.

We had an interesting experience where we actually went out and met some consumers—targeted, candidate consumers in L.A., my staff and I—sat in the car with them, and rode to work with them in the morning, because what we're talking about is asking the housewife who is cooking on an electric stove what she'd like in her first microwave. So we wanted to sit and talk with them. What would make an electric vehicle a viable choice, and what is possible? They had very significant concerns about performance. Can I

merge? Can I change my lanes? Am I in control? Am I comfortable merging in this environment?

We feel that there are ways to make that very satisfying, very confident. But then to get the range capability to give you the extended beltway capabilities on a daily basis is really where the next threshold of battery needs to be.

Mrs. MORELLA. And, then, finally, do you always have to plug into? Do you envision—

Mr. BAKER. Eventually.

Mrs. MORELLA. So, you see you're going to have the facilities with those kind of outdoor plugs, because not everyone is going to have the garage to pull in and whatever.

Mr. DAVIS. I'd like to comment on your second car proposal. With the batteries in their present state of development, I think that's pretty much second car, inner-city delivery type of vehicles is what we are looking at today. If we could hit the long-term objective of this advanced battery, then we could move this thing into the first car range and really make a significant electric vehicle that would sell in large quantities.

Dr. POWERS. Another thing we shouldn't forget is the hybrid vehicle, either. Remember, with methanol cars the way we are moving to methanol is with what we call flex fuel. You can use both for a while as you transition. So by adding a small, internal combustion engine or some other kind of engine with the electric vehicle, you might be able to get that range and that feeling of safety. That's something we are also considering.

Mrs. MORELLA. Good. Thank you all very much.

Thank you, Mr. Chairman.

Thank you, Mr. Walker, for deferring to me.

Mr. SCHEUER. Thank you, Mrs. Morella.

Has any thought been given to the danger of the lead in the battery leaching out at various points? Lead poisoning is the largest health threat to children in our country, and we are concerned about the large proliferation of lead batteries and whether that is going to constitute a health threat to our kids. Just briefly? Yes?

Mr. DAVIS. I'd like to say the batteries that the USABC is targeting have as a requirement that they be environmentally safe and recyclable, so we're trying to handle that in the future.

Mr. SCHEUER. Very good.

Congresswoman Horn of the State of Missouri?

Ms. HORN. Thank you, Mr. Chairman.

You are indicating that the 1994-1995 time frame is just for the next generation, which is at least an interim generation battery; is that correct? And you're not even sure you are on the schedule for that, or do you have some confidence that that next generation is on schedule?

Mr. BAKER. Well, let me comment, if I could. We are very confident in the program that we have underway at General Motors to deliver electric vehicles to the market place by the mid 1990s using our current best known battery technology, which is our maintenance-free, sealed, gas-recombinant, lead acid technology. And we are using that battery in a vehicle that is designed to be extremely efficient as a vehicle so the conversion of that precious little electric in a lead acid battery can be used to provide extended range.

Then, in the mid 1990s time frame, as pointed out, the United States Advanced Battery Consortium is focusing on developing a battery alternative that could be commercially developed and introduced in the mid 1990s.

Then there is a second horizon that is looking at more the late 1990s for the advanced battery systems.

So there are really three phases of battery development. One is, "win with taking all that you have", and getting into the market place and establishing a position with a credible product, develop to the mid-term, and develop to the long-term through a focused effort through the USABC. So it is really a managed progression.

Ms. HORN. Mr. Powers, you mentioned the flex system that would have an IC plus a battery. Would you elaborate on that? Is that being done through the consortium or is that being done independently by your company?

Dr. POWERS. I think all three of us have looked at that in the past. I'm not sure the consortium is looking at that in particular since the battery is the main goal of the consortium.

I think we all know how to integrate an internal combustion engine with a battery system in a total vehicle. The law in California for 1998 states, though, that it should be zero emission, which means that is, at the present time, not allowable to blend the two, but it is something that we should talk about as we go into more use of the electric vehicles.

I'm saying it is not new technology in the sense of how to blend the two.

Ms. HORN. I guess from the indications that your companies are working independently in these other areas makes me want to echo our chairman's comment about perhaps efficiencies of joint development in other areas that are definitely alternative vehicles and electric conservation worthy and all kinds of other good marketplace considerations.

Perhaps there might be some other types of ventures in addition to this relatively-limited—you're indicating to me a very limited joint venture on this USABC, whereas there seem to be some other areas there. I suppose whereas you've gotten used to talking to Japanese firms, you haven't really gotten used to talking to each other. I would just suggest that in your response to our chairman that perhaps that be something else that your people be willing to look at. It just seems like we need to go forward very quickly in many of these areas, and that might be other areas to do.

Dr. POWERS. Let me just mention one thing. We do have other consortia. In fact, the first one we started was in the area of composite materials, which is a next generation material that could take considerable weight out of vehicles. That was the one that really got us going. We also have one on environmental modeling. What is the impact of our plants on the environment, and so on?

We are in discussion in other areas. The battery was the third consortium that we put together. So there has been a change, and we all feel it is for the good. And we can do more and we will.

Ms. HORN. Have you needed Justice Department approval for the other areas?

Dr. POWERS. No. They are all under the same rule.

Ms. HORN. All in the same agreement.

Dr. POWERS. Yes.

Ms. HORN. I see.

Mr. BAKER. Typically they are in three competitive areas that are providing the capability for a manufacturer to commercialize some technical capability in a product. Then the market benefits from the conversion of that capability into a credible product.

Ms. HORN. Have you had available to you at least the ability to see what technology might have been done through the Department of Defense of NASA or anything on any of these kinds of needs that you have? We talk so much about transfer of technology, and I'll just ask that as a question.

Mr. BAKER. Certainly a key part of the United States Advanced Battery Consortium is to provide the mechanism through DOE to have a participation of the government laboratories and other departments that may have technology that could be brought to bear.

There is substantial technical capability available within the government labs and within the government departments that we feel could really provide us great insight into a lot of these areas.

The thing we don't need to do is to repeat a lot of research. What we need to do is very aggressively benefit from that and to convert it into something that can be commercially made and commercially viable.

Ms. HORN. Do you feel confident you're getting that kind of cooperation and that's happening?

Mr. BAKER. At this point yes I do.

Ms. HORN. Thank you.

Mr. SCHEUER. Thank you very much.

Now we'll hear from the very distinguished ranking minority member of our committee, a very cooperative and productive member, Congressman Bob Walker of Pennsylvania.

Mr. WALKER. Thank you, Mr. Chairman, and I thank you for this hearing. I think it is very useful and is bringing out a couple of points.

I'm excited by some of the technology that you all are developing in the area of electric cars. I think it does indicate that you are moving aggressively. I'm a car nut. And, I would only say about the Impact if it goes from 0 to 60 in 8 seconds that's still 3 seconds less than my Corvette. So you have a little ways to go yet, but—

Mr. BAKER. Well, we compromised a little bit.

Mr. WALKER. A couple of questions. First of all, I think that the Chairman's point about antitrust is useful. I have had some discussions with some of the folks in your companies about a similar kind of thing. And, it is my understanding that you do feel that the cooperative arrangements that are now there are useful in the precompetitive area and that you can put together things without specific antitrust exemptions.

Is there any place, though, within your operations where some relief from antitrust problems would, in fact, benefit you in getting generic technology developed? Do you know of any place where you are being stifled at the present time from getting the technology that we need in largely generic areas?

Dr. POWERS. I'll just say remember the key words are "pre-competitive, generic."

Mr. WALKER. Right.

Dr. POWERS. I would say that our companies are looking at what that list is, and we've already found a number of those. As you move from research to development, in development it basically means you know how to do it and now you can time it and cost it out, and that's the area we still are not into because I think we each feel we know how to do that part of it.

Mr. WALKER. And, in all honesty, when you get to development I think we want some competitiveness among you.

Dr. POWERS. That's right.

Mr. WALKER. I think we'd probably get a wider variety of products out of the competitive atmosphere at that time. But, I think we do want to assure ourselves that we are doing nothing to stand in the way of all of you cooperating in getting the generic technology that allows you all, then, to do developmental kind of work.

For instance, all the talk here today has been about batteries and using, essentially, battery technology with some kind of an electrical power plant. I am wondering how much work is going into hydrogen fuel cells as another way of essentially having an electrical-powered vehicle? Are any of you working at this point with the hydrogen fuel cell concept?

Mr. DAVIS. We are not.

Mr. WALKER. You are not?

Mr. BAKER. We are not. We are looking at fuel cells as a long-term strategy, but it is going to be well beyond the second generation of advanced battery, we believe.

Mr. WALKER. The—

Mr. BAKER. So the timeliness of the development dollar I think is important. I think there's a couple of nearer-term horizons that we would really benefit by focusing our attention on in such areas as the USABC.

Mr. WALKER. Is there anything in the law right now that would prevent you as a group of companies from working fuel cell technology? I just raise that as a—in other words, if you made a determination to go that direction, you would not have anything standing in your way to working in that particular area.

In talking to some of the executives in your companies, the one thing that I have found—and it follows up with what Mrs. Horn was saying here just a moment ago with regard to National Labs—it has been indicated to me that there may be an opportunity for far more in the way of consultation between you and National Labs than has gone on in the past. National Labs in the past largely saw themselves as defense industry assets, and, today, are beginning to understand that may be a declining trend for them and are looking for other places to move out kind of aggressively.

It has been suggested that some kind of legislation that would encourage them to cooperate very closely with you and would put in place some encouragement for the industry to work in cooperation with the National Labs might be valuable. Not that it is an absolute necessity, but just to have Congress basically endorsing the idea of these laboratories working with you might be, in fact, useful over the long term because it would give them a sense of mission in this regard. Is that a reasonable suggestion from your viewpoint?

Mr. BAKER. I think the key word there is a "sense of mission" and an agenda—a priority agenda. As we look back over time, several of the international conflicts—World War II generated nuclear power and jets. The Space Age certainly generated a lot of technology. It was a collective call to arms of industry and government together. We have just seen the power of industry-government collaboration in military aerospace.

I think we might want to think about the fact that the energy and environmental issue is one of national significance, and it can be something that we collectively focus our agenda on as a peacetime catalyst for technology development and, so to speak, our moon shot of the 1990s, that we collectively focus our attention on energy and environmental issues.

Mr. WALKER. Well, Dr. Powers or Mr. Davis, would this be—

Dr. POWERS. I think we would welcome—we already talk to the National Labs, of course—

Mr. WALKER. Sure.

Dr. POWERS.—many research areas, and have elements of our research lab that are in essentially continual touch. I agree with Ken that basically joining together sure cannot hurt us, and so we would welcome the discussion. I don't think it is as simple, though, as just saying "Go talk to each other." We would have to find focused efforts to work on.

Mr. WALKER. But, that's the point behind having legislation in that area, because one of the problems, of course, the National Labs have is that if you don't give them a specific mission that Congress has endorsed then it is not very high on their priority list. And, other things, then, can interfere, and it causes them to have the feeling that there are other things that they need to prioritize before talking to you—not that they are not willing to talk. But, at some point what they have been mandated to do comes into play and what they budget then comes into play.

In this instance, it is something it seems to me this committee could do without getting outside our jurisdiction at all. If we get antitrust we are into some other committees around here that may not be as enthusiastic as we are in those areas, but in this particular instance the National Labs are largely something where we have civilian jurisdiction and where we could mandate them to begin to utilize this particular area as a priority for them. If it is helpful, then I think that kind of legislation should be developed. In fact, we'll begin writing right away if that's something which will be—

Mr. BAKER. Focus and priority will certainly be helpful.

Mr. WALKER. Mr. Davis?

Mr. DAVIS. Yes. I'd like to say, as far as being helpful, we'd like to get out of a lot of the writing process. We're in the process of doing some work now with the Department of Energy, and anything you could do to reduce the amount of writing and paperwork would certainly be helpful and speed things along.

Mr. WALKER. The thing is, if we can develop the relationships—I get the impression that the National Labs, at this point, with the teams that they have on board, would love to develop a lot of more informal relationships than even formal relationships, that they have the teams there. They have people that have looked into a lot

of things, and they'd like to be able to share in an informal way with some of the outside industries so that there is an exchange of information that would be useful to everyone.

If we give them some idea that that is a priority with the Congress, I think that we may be able to establish exactly those kinds of contacts that would not necessitate all the paperwork that is now involved. Obviously if you get into a contractual situation with them, that's still going to involve paperwork. But, I think more appropriately some of the work that is going on in these places is really exciting stuff that is really not known outside of the Labs because they have been so isolated by their defense mission. If we can begin to reformulate that, we may have a way of providing some help along the way.

Some months ago I read in one of the publications I was reading that the Japanese—and I think it was Isuzu—had made a significant breakthrough in battery technology. Do any of you want to comment on that? Is that something that you're familiar with? Are you are working with that?

Mr. BAKER. The comment was relative to what was referred to as a "super capacitor," which is a device that can be charged very quickly and have very high power storage, but it is not an energy storage device as such and therefore would not be something that could be easily converted into an electric vehicle battery, if you will, because of the energy shortfall.

Mr. WALKER. In other words, this gives you a lot of power for a very short burst, but it does not improve the state of the art in terms of storage?

Mr. BAKER. No.

Mr. WALKER. That's helpful.

Thank you, Mr. Chairman.

Mr. SCHEUER. Thank you very much.

And now we'll hear from Congressman Howard Wolpe from the State of Michigan.

Mr. WOLPE. Mr. Chairman, thank you. Because I came in so late, I think I'm going to have to pass. I look forward to reviewing the testimony that has just been presented, however. Thank you.

Mr. SCHEUER. And now another colleague from the State of Pennsylvania, Congressman Don Ritter.

Mr. RITTER. Thanks, Mr. Chairman. Having other obligations, I will make the same comment as my colleague from Michigan and thank our witnesses and pass.

[The prepared statement of Mr. Ritter follows:]

OPENING STATEMENT

HON. DON RITTER (R-PA)

HEARING ON H.R. 1538

THE "NATIONAL ELECTRIC VEHICLE ACT OF 1991"

MAY 16, 1991

THANK YOU, MR. CHAIRMAN, AND I WISH TO COMMEND BOTH YOU FOR HOLDING THIS HEARING, AND MR. BROWN, THE CHAIRMAN OF THE FULL COMMITTEE, FOR HIS DEVOTION TO PROMOTING ELECTRIC VEHICLES AS AN ALTERNATIVE TO CONVENTIONAL VEHICLES, PARTICULARLY IN URBAN AREAS.

MORE WIDESPREAD USE OF ELECTRIC VEHICLES HAS THE POTENTIAL TO DECREASE OUR GROWING DEPENDENCE ON IMPORTED OIL. IT CAN ALSO YIELD ENVIRONMENTAL BENEFITS: BY ONE ESTIMATE, ELECTRIC VEHICLES HAVE 97 PERCENT FEWER EMISSIONS THAN CONVENTIONAL VEHICLES.

DESPITE ENCOURAGING TECHNOLOGICAL ADVANCEMENTS, ELECTRIC VEHICLES HAVE YET TO MAKE SUBSTANTIAL HEADWAY IN THE MARKETPLACE. THE MOST CRITICAL COMPONENT OF AN ELECTRIC VEHICLE IS THE BATTERY. IN FACT, IT APPEARS THAT THE GREATEST HURDLE TO MARKET ACCEPTANCE OF ELECTRIC VEHICLES IS THE UNAVAILABILITY OF A BATTERY THAT WILL MEET THE EXPECTATIONS OF MOTORISTS ACCUSTOMED TO THE PERFORMANCE OF CONVENTIONAL VEHICLES. THUS, THE FOCUS OF TITLE I OF H.R. 1538 ON TECHNOLOGY DEVELOPMENT IS WELL-PLACED.

WE CAN BECOME A NATION THAT PLUGS OUR ELECTRIC CARS INTO GARAGE WALL OUTLETS EACH NIGHT. FOR THE FORESEEABLE FUTURE, THIS WOULD CALL FOR THE USE OF CENTRALLY-GENERATED ELECTRICITY. THE PROGRAMS OF TITLE III OF THE BILL RELATE TO THE INFRASTRUCTURE NEEDED TO SUPPORT THE USE OF ELECTRIC VEHICLES. I HOPE THAT AS WE MOVE THIS BILL FORWARD, WE ALSO CONSIDER THE DEMAND FOR

ELECTRICITY CAUSED BY MASSIVE NUMBERS OF ELECTRIC VEHICLES, AND THE EVENTUAL SOURCES OF THAT ELECTRICITY.

MR. CHAIRMAN, I WOULD LIKE TO TAKE A MOMENT TO INTRODUCE MR. ARMANDO GRECO. FOR MANY YEARS, MR. GRECO HAS SERVED AS THE EXECUTIVE DIRECTOR OF THE LEHIGH AND NORTHAMPTON TRANSPORTATION AUTHORITY -- "LANTA," IN ALLENTOWN, PENNSYLVANIA, IN MY CONGRESSIONAL DISTRICT. LANTA IS INVOLVED IN A PARTNERSHIP WHICH IS AIMING TO PUT AN ELECTRIC MINIBUS INTO SERVICE IN DOWNTOWN ALLENTOWN. IT IS A UNIQUE PARTNERSHIP, AND I AM SUPPORTIVE OF ITS EFFORTS.

I WELCOME OUR OTHER WITNESSES AS WELL, AND I LOOK FORWARD TO A PRODUCTIVE HEARING.

Mr. SCHEUER. All right. At this time I would like to ask unanimous consent for the record to be kept open and for written questions to be addressed to the panel and for the panel to have time to answer those written questions.

If there is no objection, we'll hold the record open for approximately two weeks.

There being no objection, so ordered.

I want to thank this panel for your excellent testimony. We have benefited by it, and you will be hearing from us with some additional questions.

Thank you very much.

Mr. DAVIS. Thank you.

Mr. BAKER. Thank you, Mr. Chairman.

Dr. POWERS. Thank you.

Mr. SCHEUER. We'll now hear the utilities panel: Mr. Norm Bryan, Mr. Robert F. Steinke, Mr. Vern Pruett, and Mr. Armando Greco.

We're going to hear first from Mr. Armando Greco, Executive Director of the Lehigh and Northampton Transportation Authority in Allentown, Pennsylvania.

I yield to my colleague, Mr. Ritter from Pennsylvania, for the introduction.

Mr. RITTER. Thanks, Mr. Chairman.

I just want to introduce Armando Greco who for many years has served as the Executive Director of the Lehigh Northampton Transportation Authority (LANTA) in Allentown, Bethlehem eastern area, the Lehigh Valley of Pennsylvania, in my Congressional district.

Mr. Greco is known as "Mr. Public Transportation," an innovative individual who has served his community extraordinarily well.

LANTA is involved in a unique partnership which is aiming to put an electric minibus into service in downtown Allentown and prove the concept that in urban, downtown areas electric people-carrying vehicles are important.

It is something that I am very supportive of, and I look forward to his testimony and the testimony of all of our witnesses.

Mr Greco?

STATEMENT OF ARMANDO GRECO, EXECUTIVE DIRECTOR, LEHIGH AND NORTHAMPTON TRANSPORTATION AUTHORITY, ALLENTOWN, PENNSYLVANIA

Mr. GRECO. Thank you, Congressman Ritter and Mr. Chairman. I appreciate the opportunity to be here before you today representing the Lehigh and Northampton Transportation Authority.

As Congressman Ritter has indicated, we serve the Lehigh Valley, an area located about 90 miles north of the city of Philadelphia.

Our operation has the fixed-route bus service as well as a demand service that supplies van operations to the elderly and the handicapped. I think it is important to know that we experience the same type of situation as most urban areas in continuing increase and demand for services and improvements to new areas of our community. This changing and expanding travel demand pre-

sents an important opportunity to us, but also places great strains on our system's ability to respond.

The authority has attempted to address some of these concerns through the creation of local partnerships, one of which is the one that Congressman Ritter alluded to, our partnership with the Downtown Allentown Improvement Development District, normally referred to as ADIDA.

Given the short distance of the loop and the flat terrain in the downtown area of Allentown, we felt that a light, battery-powered electric vehicle could serve in a quite, pollution-free, and efficient manner.

Our investigation of the battery-powered minibus vehicles connected us with the firm Electric Vehicles SA. Pennsylvania Power and Light Company, our local utility; the Pennsylvania Energy Office; and the Pennsylvania Electric Energy Research Council jointly with LANTA and ADIDA is pursuing a two-step project, the first step being the purchase of a prototype vehicle that would be evaluated in the downtown loop. This purchase was done through funds provided through the Pennsylvania Energy Office, which is a commonwealth organization, and through monies supplied by PP&L through the Pennsylvania Electric Energy Research Council. The concept was to place this vehicle into service this past winter.

With a hopefully successful completion of the prototype operation, at least two additional vehicles will be purchased by LANTA and ADIDA to complete the full circulator service. It is important to note that these vehicles would be purchased through the assistance of a grant from the Urban Mass Transportation Administration, part of the U.S. Department of Transportation.

I have to say that we are a little disappointed and that the project is moving along more slowly than we expected, although I do believe the partners remain convinced that the electric vehicle technology can fit within the downtown circulator system in a proper manner.

Our experience with this small project—and I emphasize "small project"—and a recognition of the importance of establishing incentives to encourage the development and use of alternatively-fueled vehicles including electric vehicles brings LANTA to urge your prompt and favorable action on H.R. 1538. We have some specific comments.

From our limited testing of the EVSA vehicle, it is clear that, in order to achieve widespread use of the vehicle within our system beyond the downtown areas, improvement in battery technology is essential. I think we took a lot of time to talk about that today. Therefore, our suggestion under title one is that battery technology development be placed as the priority and that the legislation appropriate funds in that manner showed through the distribution of funds.

Under title two there are several comments that we think are worthy of your consideration. First, funds available to State and local governments through other Federal sources such as the Urban Mass Transportation Administration should be considered as part of the State and local support of any demonstration project. Leveraging of other Federal dollars is as important to the goal of

increasing the number of electric vehicles within the demonstration projects as is the availability of other local and State dollars.

Number two, the legislation sets forth the number of vehicles to be included in any demonstration project should be no less than 100. Although there is an exception within the legislation that permits the Secretary to select projects that have fewer than 100 vehicles, this authority is concerned that this general target will limit participation in demonstration programs to only the largest of the communities.

We believe that it is important that the demonstration program permit a variety of fleet sizes, looking at a variety of types of vehicles, not only private vehicles but minivans and maybe buses, along with a variety of geographic and other climatic areas already identified.

Title three of the legislation is essential in that the electric vehicle is contingent upon the availability of servicing and refueling facilities. In our review of the legislation, we do note that there is no indication that this demonstration site should be closely aligned with the other parts, the actual minibus or minivehicle part of the demonstration.

In closing, LANTA is obviously indicating its support of the piece of legislation here today. We believe that the authorization of over $600 million designed to create cooperative and joint ventures with manufacturers, electric suppliers, local and State governments, is a preferred legislative approach that matches Federal policy with Federal financial support.

The legislation also is a preferred approach since it builds on the foundations of the Clean Air Act amendments of 1990 and does not prejudge or mandate specific technologies or fuels. The composition of this legislation recognizes that alternative fuel research is in its development stage and in its infancy.

As a regional public transportation authority we cannot close this testimony without emphasis that the use of alternative fuels in transportation sector is only part of the response our Nation needs to improve air quality and energy efficiency.

Our Nation cannot continue the current travel habits that it currently has without change. Past technological changes have reduced emissions by individual vehicles, but steady growth in vehicle miles of travel have kept overall fuel use and emissions high.

More closely linking mobility goals with broader national goals expressed through the Clean Air Act, through the Americans with Disabilities Act, through energy conservation initiatives must include a redefinition of transit and transportation. The Federal Government's role must be broadened to promote and finance increased ability and availability of high occupancy vehicles and shared ride services.

We thank you for this opportunity and certainly we are available for questions.

[The prepared statement of Mr. Greco follows:]

TESTIMONY OF THE
LEHIGH AND NORTHAMPTON TRANSPORTATION AUTHORITY
BEFORE THE
SUBCOMMITTEE ON ENVIRONMENT
OF THE
HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

MAY 16, 1991

STATEMENT BY

ARMANDO V. GRECO
EXECUTIVE DIRECTOR

LEHIGH AND NORTHAMPTON TRANSPORTATION AUTHORITY
12TH & CUMBERLAND STREETS
ALLENTOWN, PA 18103

TESTIMONY OF THE
LEHIGH AND NORTHAMPTON TRANSPORTATION AUTHORITY
BEFORE THE
SUBCOMMITTEE ON ENVIRONMENT
OF THE
HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

MAY 16, 1991

STATEMENT BY

ARMANDO V GRECO
EXECUTIVE DIRECTOR

LEHIGH AND NORTHAMPTON TRANSPORTATION AUTHORITY
12TH AND CUMBERLAND STREETS
ALLENTOWN, PA

The Lehigh and Northampton Transportation Authority is pleased to have this opportunity to address the Subcommittee on Environment, House Committee on Science, Space, and Technology regarding the National Electric Vehicle Act of 1991 - H.R. 1538. My name is Armando V. Greco. I am Executive Director of the Authority which is normally referred to as LANTA.

To place the comments that will be made into perspective, it is important that you know a bit about LANTA and our current efforts to test and evaluate electric vehicle technology. The Authority was created in 1972 by the counties of Lehigh and Northampton, Pennsylvania for the purpose of supplying public transportation services. Our service area, located about 60 miles north of Philadelphia, has a population of approximately 500,000. This service area includes the cities of Allentown, Bethlehem and Easton.

Metro, our fixed route bus operation, supplies 2,000,000 miles of service and 4.5 million passenger trips each year over 18 routes. Metro Plus, our specialized transportation division, was created in 1988 to coordinate and broker specialized transportation services to the elderly and people with disabilities. Annually, 280,000 trips are delivered through this specialized system.

Within the context of our operations we have seen a continual increase in demand for new and improved services. This demand has come from newly developing commercial and industrial areas located on the fringe of our urban community, through an

ever increasing demand from the elderly and those with disabilities in our community to provide them with access to much needed services and employment centers, and for improved services throughout the urban area including more frequent peak hour and expanded evening and off-peak operations. This changing and expanding travel demand pattern presents an important opportunity, but also places great strains on the system's ability to respond.

The Authority has attempted to address some of these concerns through the creation of local partnerships with other municipal and private organizations. The Allentown circulator project is one such example. It provides complimentary service to current Metro operations through the linear central business district of Allentown. The circulator is operated in partnership with the Allentown Downtown Improvement District Authority (ADIDA).

Resulting from a study completed in June of 1990, LANTA and ADIDA agreed to pursue an expansion of the existing circulator operation which currently uses a trolley facsimile vehicle. The proposed system would have at least 3 minibus type vehicles designed to improve circulator coverage and reliability. The partnership in its early discussions agreed to actively pursue the use of an alternate fuel vehicle. Given the short distance of the loop and the flat terrain, we felt that a light, battery-powered electric vehicle could serve in a quiet, pollution-free, efficient manner.

An investigation of the battery-powered vehicles connected us to the firm of Electric Vehicles, S.A. (EVSA). Pennsylvania Power and Light Co. (PP&L), the Pennsylvania Energy Office (PEO), and the Pennsylvania Electric Energy Research Council (PEERC) joined with LANTA and ADIDA to pursue a two step project.

1. A prototype electric minibus and associated equipment would be purchased from EVSA through funds provided by the PEO and PP&L operating through PEERC. This vehicle was intended to be placed into circulator service during the winter of 1990-91.

2. With the successful completion of the prototype operation, at least two additional electric vehicles would be purchased by LANTA and ADIDA to complete the full circulator service. These vehicles would be purchased through an assistance grant from the Urban Mass Transportation Administration.

Progress on the implementation of this project has moved more slowly than expected. The EVSA vehicle was delivered in the fall of 1990. Certain off-road tests were performed on the Mack Trucks Inc. test track located in Allentown. These tests proved to be generally satisfactory. However, due to development difficulties, the vehicle's weight, and other minor problems,

the Authority has been restrained from placing this vehicle in test passenger service.

Rather than making substantial modifications to the first vehicle, the partnership is now pursuing the replacement of this vehicle with another minibus that would meet all required motor vehicle safety standards and permit us to begin the passenger service test phase of our circulator program.

Although disappointed in this delay the partners remain convinced that the electric vehicle technology can function properly within the downtown circulator system. It may take longer than expected, but the partners are committed to proceeding to its successful conclusion. It is, however, clear that LANTA and ADIDA as public authorities could not pursue such a project without the support of public/private organizations with the capabilities and resources to pursue new and innovative projects.

This last comment leads us to the purpose of the presentation here today. Our experience with this relatively small project and our recognition of the importance of establishing incentives to encourage the development and use of alternatively fueled vehicles, including electric vehicles, brings LANTA to urge your prompt and favorable action on H.R. 1538, the National Electric Vehicle Act of 1991. H.R. 1538 would create important partnerships that include the Federal government as well as the private sector and state and local governments to develop and commercialize electric vehicle technology. This bill, along with other similar bills, would authorize cooperative and joint ventures to test a wide range of alternative fuels for use in the public transit systems throughout the country. It builds on the foundation of the Clean Air Act Amendments of 1990 and does not prejudge or mandate specific technologies or fuels. Indeed, it is a welcomed approach that recognizes it is premature to consider technological mandates to achieve certain emission standards and, at the same time, this bill sets forth financial support to initiate development of new technologies that can and should be made available in the future.

With regard to the details of H.R. 1538, the Authority does set forth some specific recommendations. We will leave the technical development issues to those who are expert in electric vehicle design and development. The comments are directed at how this Authority or those similar to us could better participate in the programs set forth.

Title I. Electric Vehicle and Battery Research and Development Program

From our limited testing of the EVSA vehicle, it is clear that in order to achieve widespread use of the vehicle within our

system, improvement in battery technology is essential. Based on the limited discussions we have had with those involved with our project, we have concluded that various powertrain components are well tested and available, but if major gains are to be achieved they will come through new battery technology. That technology, we expect would improve the weight, range, and serviceability of the power cells. Our suggestion, therefore, under Title I, is that battery technology development be placed as the priority research component of this section of this legislation with appropriate funding level distribution.

Title II. Electric Vehicle Commercial Demonstration Program

The provision of funding for commercial demonstration is strongly supported in that it would be a major assist to creating markets for electric vehicles. The financing of the differential cost between electric vehicles and gasoline powered vehicles will encourage a wider participation among the various private and public fleet owners. Within this title there are several comments that we think are worthy of your consideration.

1. Funds available to state and local governments through other federal sources such as the Urban Mass Transportation Administration should be considered as part of the state and local support of a demonstration project. Leveraging of other federal dollars is as important to the goal of increasing the number of electric vehicles within the demonstration as the availability of state or local dollars.

2. The legislation sets forth that the number of electric vehicles to be included in the demonstration project should be no less than 100. Although there is an exception that permits the Secretary to select other projects that have fewer than 100 vehicles the Authority is concerned that this general target will limit the participation to only the largest of communities. A small minibus program operated within a community such as ours could add significant input to the evaluation and demonstration of the electric vehicle concept. We don't believe that the electric vehicle has to replicate the performance of our diesel fleet. Our feeling is that there would be certain portions of our market, such as the downtown circulator, that would present a good match between what is possible and what is not possible in the electric vehicle performance specter. Thus, we believe it is important that the demonstration program permit a variety of fleet sizes, as well as a variety of geographic and climatic areas.

Title III. Electric Vehicle Infrastructure Development Program

This part of the legislation is essential in that the electric vehicle is contingent upon the availability of servicing and refueling facilities. It does, however, appear appropriate that the infrastructure demonstration sites should be closely related to those sites selected for minibus development and demonstration projects.

In closing, LANTA supports legislative initiatives, such as H.R. 1538, which promote the development and use of alternative fuel vehicles, including electric vehicles. The authorization of over $600,000,000 designed to create cooperative and joint ventures with manufacturers, electric suppliers, and local and state governments is a preferred legislative approach that matches federal policy with financial support. This legislative approach is also preferred since it builds on the foundations of the Clean Air Act amendments of 1990 and does not prejudge or mandates specific technologies or fuels. The composition of this legislation recognizes that alternative fuel research and development is at its infancy.

As a regional public transportation authority we cannot close this testimony without emphasis that the use of alternative fuels in the transportation sector is only a partial response to our nation's need to improve air quality and energy efficiency. Our nation cannot continue its current travel habits without change. At the present accelerated growth in vehicle miles of travel (VMT) by the year 2020 it is possible to project a necessary doubling of our road system. Of necessity, we must reduce our dependency on single occupancy vehicle travel.

Past technological changes have reduced emissions by individual vehicles but steady growth in VMT has kept overall fuel use and emissions high. To more closely link mobility goals and broader national goals expressed through the Clean Air Act, the Americans with Disabilities Act, and energy conservation programs, we must redefine transit. The federal government's role must be broadened to promote and finance increased availability and use of high-occupancy, shared ride services. This effort will better serve diverse travel needs, promote coodination between modes, and reduce vehicle miles of travel.

The Authority thanks you for the opportunity to address this hearing. If there are any questions, I would be pleased to answer them. Additional information will be forwarded upon request.

Mr. SCHEUER. Thank you.

I understand that the remaining three speakers on this panel will be represented by you, Mr. Bryan?

Mr. BRYAN. We will each speak, and we are here representing our individual companies as well as the Electric Transportation Coalition, a consortium of utilities, domestic auto manufacturers, and State and local governments. What we want to do is each focus on some short remarks on each of the three titles to try to give you a feel for what we would like to say.

Mr. SCHEUER. We must be out of here to meet the Queen by 10 after 11:00. She's going to start speaking at 11:15. That gives us seven or eight minutes.

I was informed that you were going to speak for the group. If you all want to speak, that's perfectly fine. We'll come back here in perhaps three-quarters of an hour. We should be back by 12:00 or 12:15, if that's satisfactory to you.

Mr. BRYAN. That's satisfactory to me, Mr. Chairman.

Mr. RITTER. Mr. Chairman?

Mr. SCHEUER. Yes.

Mr. RITTER. If the Chairman would yield, I should alert the Chairman that this is the New York City Congressional weekend. I think just about everybody is going to be on a bus to the train station, or half the membership, just FYI.

Mr. SCHEUER. What time does that bus leave?

Mr. RITTER. The train leaves at 1:30.

Mr. SCHEUER. So they'll be out of here by 12:30.

All right. Why don't we take one of you and then we'll come back and hear the rest of the panel.

Mr. BRYAN. We may be able to get more than one if we shorten up our comments.

Mr. SCHEUER. Very good. I would be happy to recognize you, Mr. Bryan. I thank you all for your courtesy, and I appreciate your indulgence for this unusual morning. It is the first time in 204 years that a foreign chief of state, reigning monarch, has appeared here.

I would remind you all that your full testimony will be printed in the record just as you have prepared it at the point where you have testified.

Please proceed for such time as you may need, Mr. Bryan, knowing that we will suspend this hearing at 10 minutes after 11:00.

Thank you.

STATEMENT OF NORM BRYAN, VICE PRESIDENT, PACIFIC GAS AND ELECTRIC, SANTA ROSA, CALIFORNIA

Mr. BRYAN. Thank you, Mr. Chairman.

In addition to our oral comments, we are also submitting written testimony that we would like to be part of the record that comes from—

Mr. SCHEUER. I just said that your remarks will be printed in full at the point at which you testify.

Mr. BRYAN. And we would like to endorse H.R. 1538 on behalf of the coalition and ask for prompt and favorable action. We do feel that it does offer significant benefits that can be achieved through the research and development that I would like to talk about.

I would like to say first, though, that my own company is very interested in electric vehicles, but we are also aggressively pursuing natural gas vehicles, having opened 12 publicly-accessible stations, looking over the next year to open additional stations. We have our own vehicles and customer vehicles utilizing those facilities, which we will increase to well over 1,500 vehicles by the end of next year, and we hope to translate this success to our electric vehicle program.

We currently have three of the General Motors G vans that we are using for both research and development, as well as demonstrations, and we believe that these electric vehicles will offer significant environmental, energy security, and energy efficiency advantages over the current transportation systems.

First, to the pollution, there are widespread pollution benefits, and the World Resources Institute, for example, estimates that by the year 2000 electric vehicles could reduce greenhouse gases by 25 percent on a per mile basis.

Mr. SCHEUER. The World Resources Institute will testify here after this hearing.

Mr. BRYAN. Okay.

The self-sufficiency benefits we think are also accrued to electric vehicles. It is a domestic source. Most of the feed stock to electric generation are currently domestic sources, and the DOE estimates that over 40 million electric and hybrid vehicles could be charged without the additional construction of any generating plants.

But, despite these benefits, there is neither affordable technology nor customer acceptance existing in the market place, as was discussed with the auto companies, and we feel that the partnership funding proposed by this bill for the private and government sectors will overcome those hurdles and allow these vehicles to be commercially viable.

I was also going to discuss the Advanced Battery Consortium, but I believe the auto industry has done an excellent job of that.

Other issues that we think ought to be addressed with the R&D program consist of high-efficiency powertrains, lightweight body structures, user friendly on-board charging systems, which are going to be critical to these vehicles being customer acceptable. And we feel that the private sector cofunding will enable us also to meet the goals that have been outlined in the California Air Resources Board rulings that were discussed earlier.

I think it is significant to note, too, that there are other States that are considering adopting those regulations, which should address the question you had, Mr. Chairman, about whether there will be a significant marketplace out there. I believe the 40,000 vehicles that are talked about in California in the first year of 1998, which expands to 200,000 vehicles in 2003, are only the tip of the iceberg for the marketplace that will exist at that time because of additional legislation that we see.

Mr. SCHEUER. We fervently hope that you are right.

Mr. BRYAN. We are going to do all we can to see that we can make it happen, too.

I think that what I'd like to do now is to defer to my other panel members to have some remarks on the other two titles of the bill.

Mr. SCHEUER. Mr. Bryan, we'll be happy to hear from your colleagues after we recess, which is going to be in about one minute, and I want to take up that one minute to express my admiration for the utilities industry in California for the remarkably imaginative and resourceful and creative work that they are now doing to encourage energy conservation and energy efficiency.

I attended an energy meeting out there a couple of days ago last weekend in San Diego sponsored by the utilities industry, I believe. I mentioned then that something interesting happened on the way to the circus. The United States Government in Washington has sort of withdrawn from the field of energy efficiency, energy conservation, and alternative fuels. They have left a tremendous vacuum there. And interestingly to behold, the States are filling that vacuum.

Enlightened governors all over the place—but particularly in California in recent years, governors of New York, Massachusetts, two or three other States—are encouraging utilities to engage in least-cost financing. The principle is that the energy that is available that is least costly to society not only in dollar terms but in environment terms and so forth is the energy that you save. Utilities like PG&E and SMUD—the Sacramento Municipal Utilities District—are engaged in the most imaginative kinds of assistance to customers helping them get their act together, helping them in vary favorable financing to install state-of- the-art technology that will reduce their need to consume energy.

I just want to congratulate you and, through you, the entire utilities industry in the State of California and throughout the country for the remarkable way in which they have helped fill this vacuum of leadership that the current Administration has produced in Washington.

You've really shown that there is a major and dramatic role for States and private enterprise to play in these important national goals like preserving the environment, like engaging in energy efficient and energy conserving programs for the benefit of all of our society.

I congratulate you and I hope you will spread the word to your colleagues.

Mr. BRYAN. Thank you, Mr. Chairman. I will.

[The prepared statement of Mr. Bryan follows:]

Final

Oral Statement of Norm Bryan
Vice President
Pacific Gas and Electric Company

before the

Subcommittee on Environment
Committee on Science, Space and Technology
U.S. House of Representatives

May 16, 1991

Mr. Chairman and members of the Subcommittee, I appreciate the opportunity to appear before you. My name is Norm Bryan, and I am a Vice President, Clean Air Vehicles at Pacific Gas and Electric, an investor-owned utility, headquartered in San Francisco, California. PG&E provides electricity and natural gas service to more than 11 million people in northern and central California.

We currently have a number of programs underway that are designed to better the environment. They include customer energy efficiency programs to reduce peak use by 2500 megawatts by the year 2000, the development of renewable resources and significant efforts to promote the development and use of natural gas for

vehicles, and research and development to make electric vehicles commercially available.

My fellow panelists and I are here today representing our individual companies as well as the Electric Transportation Coalition. The Coalition is an ad hoc group of electric utilities, domestic automobile manufacturers, state and local governments, national organizations and others who are interested in promoting the use of electricity in the transportation sector. We ask that a written statement, submitted jointly by this panel on behalf of the Electric Transportation Coalition, be included in the record of this proceeding.

On behalf of the Coalition, we endorse H.R. 1538 and urge prompt and favorable action by this Committee. To provide you with a complete picture of our position on the legislation we have each organized our comments to focus on a separate title of the bill. Since my company is supporting research and development efforts with respect to electric vehicles, I have chosen to direct my remarks to Title I of H.R. 1538, which authorizes a comprehensive electric vehicle and battery research and development program within the Department of Energy.

While PG&E is extremely interested in electric vehicles becoming commercially available, we also have a long-standing, aggressive and very successful natural gas vehicle program. In March of last year, we opened the first publicly accessible natural gas fueling station in California at our service center in Concord. Since then, we have opened a total of 12 publicly accessible stations, the most recent one was a joint effort with Shell Oil Company in Sacramento, California on April 16. PG&E currently owns and operates 160 natural gas vehicles, and is serving a like number of customer vehicles. By the end of 1992, we plan to add 25 additional fueling stations, 800 customer vehicles and 550 additional PG&E vehicles. We hope to translate this success to our electric vehicle program. We currently have 3 electric-powered General Motors G-Vans that we are using to conduct R&D experiments and customer demonstrations to achieve that end.

My company is committed to developing electric vehicles because of the significant environmental, energy efficiency, national energy security and other advantages they offer.

First, widespread use of vehicles powered by electricity will result in major pollutant emission reductions in the transportation

sector. Studies have shown that these vehicles will produce significantly fewer overall emissions even when measured from the powerplant than do gasoline vehicles. As an example, the World Resources Institute estimates that by the year 2000 greenhouse gas emissions from automobiles could fall by 25% per mile driven where EVs are substituted for gasoline powered cars.

EVs also offer significant energy security benefits by utilizing a "fuel" that is produced domestically and is in abundant supply. The U.S. is largely self-sufficient in the feedstocks we use to produce electricity, and estimates by DOE indicate that between the years 1995 and 2000, U.S. utilities will have sufficient capacity -- without the need to add new powerplants -- to recharge batteries for more than 40 million electric and electric-hybrid vehicles.

Despite these benefits, neither affordable technology nor customer acceptance exist today to ensure the use of EVs by the mid-to-late 1990s. Before consumers will purchase these vehicles, they must be proven reliable and affordable, and meet customer preferences and requirements.

A first important question is will the technology work? Title I of H.R. 1538 seeks to create partnerships between the private and public sectors to assure that the answer is unequivocally "Yes". The National Electric Vehicle Act provides significant federal funding, which would be highly leveraged by private sector cost-sharing, to accelerate research and development into advanced electric vehicle technology including advanced batteries.

As the Subcommittee is aware, the electric utility industry, the "Big Three" domestic automakers, the battery manufacturers, and the federal government, through the Department of Energy, are attempting to form a joint venture to pursue the development of advanced electric vehicle batteries. The Bush Administration has indicated that it is willing to provide significant funding to this effort and the private sector participants are working for agreement to match any government-provided funds.

The legislation under consideration today would authorize not only an advanced battery research and development program like the one being formed, but it would also authorize the establishment of other extremely important federal and industry cost-shared R&D

programs to develop such things as high efficiency electric power trains, light-weight body structures, user-friendly onboard battery charging systems, efficient auxilliary components, and other technology that can improve the performance, reliability, competitiveness, and customer acceptance of electric vehicles.

The research and development contemplated and funded under this bill, and the encouragement for significant private sector contribution to the effort, are critical to enabling us to meet our goal in California of placing substantial numbers of electric vehicles on the roadways beginning in model year 1998.

As you may be aware, California has adopted mandates that will cause the manufacture and sale of electric vehicles. Beginning in 1998, automobile manufacturers selling vehicles in California must provide two percent of their expected vehicle sales for the year as "zero emission vehicles". The only type of vehicles that meet this definition are those powered by electricity. Based on the numbers of new vehicles currently being sold every year in California, it is estimated that this 2% requirement equates to approximately 40,000 electric vehicles. The required number of electric vehicles will

increase to 5%, or approximately 100,000 vehicles, in the year 2000 and then will increase to 10%, or 200,000 vehicles annually, from the year 2003 forward. It is important to note that a number of other states, including Massachusetts, New York and Maryland are contemplating adopting the California requirements.

However, these production and sale requirements may not be feasible in the timeframe contemplated without the provision of federal incentives, like the ones provided under H.R. 1538. We, therefore, urge favorable consideration of the legislation by this Subcommittee and are hopeful that the Congress will act swiftly to enact H.R. 1538 into law. Thank you for this opportunity to present testimony to the Subcommittee.

Mr. SCHEUER. All right.

We will now suspend this hearing until we have heard from Her Majesty the Queen in approximately three quarters of an hour.

[Recess.]

Mr. SCHEUER. The hearing will be resumed. I apologize for the delay. It isn't often that we are visited by Her Majesty the Queen and His Royal Highness, Prince Philip.

We have heard from Mr. Greco and Mr. Bryan, and now we'll hear from Mr. Steinke and Mr. Pruett.

Mr. Steinke, please take your five minutes and then we may have some questions for you.

STATEMENT OF ROBERT F. STEINKE, VICE PRESIDENT, BUSINESS AND TECHNICAL SUPPORT, PUBLIC SERVICE ELECTRIC AND GAS, NEWARK, NEW JERSEY

Mr. STEINKE. Thank you, Mr. Chairman.

I am Robert Steinke, Vice President of Business and Technical Support, a Public Service Electric and Gas Company located in Newark, New Jersey. I appreciate the invitation to appear before you today to express my company's strong support for the National Electric Vehicle Act of 1991, introduced by Chairman George Brown.

By way of background, PSE&G is an investor-owned electric and gas utility with approximately 13,000 employees. We serve approximately 5.5 million people in 2,600 square miles that run across the State of New Jersey, across an industrial and commercial and residential corridor.

Our highly diversified and heavily populated area includes New Jersey's six major cities, as well as nearly 300 suburban, rural, and nearby communities—three-quarters of the State's population.

Our company has acquired eight full-sized electric G vans, which we intend and are employing in our business in the research and development program to demonstrate fleet and passenger transportation, to familiarize our customers in our service territory with the important benefits of EV operation.

Mr. Chairman, I'm pleased to tell you that last week PSE&G joined with the New Jersey Department of Environmental Protection, DEP, in announcing a large-scale demonstration project involving alternate fuel vehicles. This public and private partnership will demonstrate the advantages of alternate fuel vehicles in a very visible way to all the citizens of our State.

In addition, we are participating in a regional user's group with New York utilities, and we share the electric vehicle data and our operating experience.

Last fall I had an opportunity to testify before this subcommittee and encourage the use of electric vehicles. Since that time, much has happened. The war in the Persian Gulf brought home the danger of our continued reliance on foreign energy supplies. The enactment of the Clean Air legislation and the actions in California and other States has begun to condition our national thinking towards the use of alternate fuel vehicles.

The Administration has offered a National Energy Strategy. Energy policy legislation introduced in the House and Senate that

address the petroleum-based fuels in transportation sector has taken place.

From New Jersey's perspective, we face a great need to encourage the greater reliance on alternate fuel vehicles. New Jersey has the highest population density and the most vehicles per square mile of any of the 50 States in the Nation. While technology and its advances prompted by Federal and State regulations have reduced vehicle emissions and increased vehicle efficiency, improvements haven't eliminated the air quality problems that we have in our State and across the Nation.

New Jersey is an ozone nonattainment area. Nonattainment of carbon monoxide is also a problem. Areas of northern New Jersey experience carbon monoxide that exceed the Federal health standards by more than 50 percent. In New Jersey approximately 50 percent of the volatile organic compounds and 40 percent of oxygens of nitrogen—both precursors of ozone — come from mobile sources. Furthermore, motor vehicles are estimated to be responsible for 85 percent of carbon monoxide emissions.

New Jersey and other Northeastern States are considering adopting a vehicle emissions control model just like California. We need the environmental benefits of electric vehicles in New Jersey—an electric vehicle that can cut the VOC emissions by 98 percent, carbon monoxide emissions by 99 percent when compared to a gasoline vehicle, nitrogen oxide emissions that would significantly be reduced, even when you take into account the offset by generating the electricity in our power plants.

All of these environmental benefits would be accompanied by an important energy security benefit, as well—domestic fuel resources.

We believe at PSE&G that 1538 offers a carefully crafted, comprehensive package of incentives that will advance the day when electric vehicles will be widespread throughout our Nation.

I'd like to briefly focus on Title III of the legislation which encourages the development of the infrastructure—the infrastructure necessary to support the use of electric vehicles.

The need to develop an infrastructure to operate, maintain, and service electric vehicles is widely recognized. EV technology is different from what the average driver or fleet operator is used to and will be necessary to support this structure and put in place assistance to operators making this transition. Questions about vehicle recharging, servicing, routine maintenance, battery disposal—all these will arise, and we must have the answer to these questions before the public will feel confident with the fleet of electric vehicles that are out there.

Title III of H.R. 1538 would create two infrastructure development programs. The Secretary of Energy would be authorized to enter into as many as five joint ventures with the private sector for cost sharing research, development, and demonstration of the infrastructure programs.

Projects could include such diverse issues as: equipping existing gasoline stations to service electric vehicles, the installation of charging facilities in public buildings, rate structures that are designed to encourage investment by utilities in infrastructure and capital equipment, and also — and by no means last—public education programs.

Joint ventures selected for this program must represent geographically and climatically diverse regions of the country. We need information that will facilitate the use of electric vehicles throughout the Nation, even though just now we are interested in those pollution areas.

The private sector must provide substantial support—50 percent of the cost—to leverage the Federal funds that might be available under this legislation.

H.R. 1538 also recognizes that State and local governments must play a key role—in many respects a leading role—in the effort to get alternate fuel vehicles on the road.

And the Federal Government should encourage all States to critically evaluate the prospects for the use of not only electric vehicles, but all clean alternate vehicles, as well.

H.R. 1538 would make Federal information, technical and grant assistance available to States that would like to receive voluntary electric vehicle assistance, and it will assure introduction of electric vehicles and other clean alternate vehicles into the State by the year 2000.

The infrastructure program of Title III, coupled with the technology of R&D and market stimulation activities called for under this legislation will begin to provide answers to many of the questions that the driving public and others have concerning electric vehicles.

The real test of electric vehicles will not come in the laboratory or the test tracks, but will come in the marketplace. Challenges remain with respect to advancing the technology of the battery and the vehicle, itself, and the National Electric Vehicle Act will help us make significant progress in these areas. The strength of H.R. 1538, however, lies in the fact that it goes beyond the technical development and addresses the problems of infrastructure and marketplace — development that must be resolved before the electric vehicle technology will be accepted by the public, by the government.

Government and industry must work together to achieve these goals, and this bill, H.R. 1538, provides the necessary framework for this partnership and cooperation.

In summation, from our perspective in New Jersey we believe that electric vehicles can and will play a significant role in improving our air quality. We strongly support H.R. 1538 as a catalyst to increase domestic vehicle production and distribution.

Thank you, Mr. Chairman. I'd be appreciative to answer any questions you may have.

[The prepared statement of Mr. Steinke follows:]

FINAL VERSION

STATEMENT OF ROBERT F. STEINKE
VICE PRESIDENT - BUSINESS AND TECHNICAL SUPPORT
PUBLIC SERVICE ELECTRIC AND GAS COMPANY

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT
COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

MAY 16, 1991

MR. CHAIRMAN, I AM ROBERT F. STEINKE, VICE PRESIDENT OF BUSINESS AND TECHNICAL SUPPORT FOR THE PUBLIC SERVICE ELECTRIC AND GAS COMPANY LOCATED IN NEWARK, NEW JERSEY. I APPRECIATE THE INVITATION TO APPEAR BEFORE YOU TODAY TO EXPRESS MY COMPANY'S STRONG SUPPORT FOR THE NATIONAL ELECTRIC VEHICLE ACT OF 1991, INTRODUCED BY CHAIRMAN GEORGE BROWN.

BY WAY OF BACKGROUND, PSE&G IS AN INVESTOR OWNED ELECTRIC AND GAS UTILITY WITH APPROXIMATELY 13,000 EMPLOYEES. WE SERVE APPROXIMATELY 5.5 MILLION PEOPLE IN A 2,600 SQUARE MILE SERVICE AREA THAT RUNS ACROSS THE STATE OF NEW JERSEY'S INDUSTRIAL AND COMMERCIAL

CORRIDOR. THIS HIGHLY DIVERSIFIED AND HEAVILY POPULATED AREA INCLUDES NEW JERSEY'S SIX MAJOR CITIES AS WELL AS NEARLY 300 SUBURBAN AND RURAL COMMUNITIES, AND NEARLY THREE-QUARTERS OF THE STATE'S POPULATION. PSE&G HAS ACQUIRED EIGHT FULL-SIZED ELECTRIC G-VANS, WHICH WE INTEND TO EMPLOY IN OUR OWN R&D PROGRAM AND IN OUR FLEET AND IN DEMONSTRATIONS TO FAMILIARIZE CONSUMERS IN OUR SERVICE TERRITORY WITH THE IMPORTANT BENEFITS OF EV OPERATION. MR. CHAIRMAN, I AM PLEASED TO TELL YOU THAT LAST WEEK PSE&G JOINED WITH THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, OR DEP, IN ANNOUNCING A LARGE SCALE DEMONSTRATION PROJECT INVOLVING ALTERNATIVE FUEL VEHICLES. THIS PUBLIC/PRIVATE PARTNERSHIP WILL DEMONSTRATE THE ADVANTAGES OF ALTERNATIVE FUEL VEHICLES IN A VERY VISIBLE WAY TO THE CITIZENS OF NEW JERSEY. IN ADDITION, WE ARE PARTICIPATING IN A REGIONAL USERS GROUP WITH NEW YORK UTILITIES TO SHARE ELECTRIC VEHICLE DATA AND OPERATING EXPERIENCE.

LAST FALL, I HAD THE OPPORTUNITY TO TESTIFY BEFORE THE SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS ON THE NEED FOR FEDERAL POLICIES TO ENCOURAGE THE USE OF ELECTRIC VEHICLES. SINCE THAT TIME, MUCH HAS HAPPENED. THE WAR IN THE PERSIAN GULF BROUGHT HOME THE DANGER OF OUR CONTINUED RELIANCE ON FOREIGN ENERGY SUPPLIES. THE ENACTMENT OF CLEAN AIR LEGISLATION, ALONG WITH THE ACTIONS TAKEN BY CALIFORNIA AND OTHER STATES, HAS BEGUN TO CONDITION OUR NATIONAL THINKING TOWARD THE USE OF ALTERNATIVELY FUELED VEHICLES. THE ADMINISTRATION HAS OFFERED A NATIONAL ENERGY STRATEGY, AND ENERGY POLICY LEGISLATION HAS BEEN INTRODUCED IN THE HOUSE AND SENATE, THAT ADDRESS THE USE OF PETROLEUM-BASED FUELS IN THE TRANSPORTATION SECTOR.

FROM NEW JERSEY'S PERSPECTIVE, WE FACE A GREAT NEED TO ENCOURAGE GREATER RELIANCE ON ALTERNATIVELY FUELED VEHICLES. NEW JERSEY HAS THE HIGHEST POPULATION DENSITY AND THE MOST VEHICLES PER SQUARE MILE OF ANY OF

THE 50 STATES. WHILE TECHNOLOGICAL ADVANCES PROMPTED BY FEDERAL AND STATE REGULATIONS HAVE REDUCED VEHICLE EMISSIONS AND INCREASED VEHICLE FUEL EFFICIENCY, THESE IMPROVEMENTS HAVE NOT ELIMINATED AIR QUALITY PROBLEMS. THE ENTIRE STATE OF NEW JERSEY IS AN OZONE NONATTAINMENT AREA. NONATTAINMENT OF CARBON MONOXIDE IS ALSO A RECURRENT PROBLEM; AREAS OF NORTHERN NEW JERSEY EXPERIENCE LEVELS OF CARBON MONOXIDE THAT EXCEED FEDERAL HEALTH STANDARDS BY MORE THAN 50 PERCENT.

IN NEW JERSEY, APPROXIMATELY 50 PERCENT OF THE VOLATILE ORGANIC COMPOUNDS (VOCS) AND 40 PERCENT OF THE OXIDES OF NITROGEN, BOTH PRECURSORS OF OZONE, COME FROM MOBILE SOURCES. FURTHERMORE, MOTOR VEHICLES ARE ESTIMATED TO BE RESPONSIBLE FOR 85 PERCENT OF CARBON MONOXIDE EMISSIONS. NEW JERSEY AND OTHER NORTHEASTERN STATES ARE CONSIDERING ADOPTING VEHICLE EMISSIONS CONTROLS MODELED ON THOSE ADOPTED IN CALIFORNIA.

WE NEED THE ENVIRONMENTAL BENEFITS OF ELECTRIC VEHICLES IN NEW JERSEY. AN ELECTRIC VEHICLE CAN CUT VOC EMISSIONS BY 98 PERCENT AND CARBON MONOXIDE EMISSIONS BY 99 PERCENT WHEN COMPARED TO A GASOLINE VEHICLE. NITROGEN OXIDE EMISSIONS WOULD ALSO BE SIGNIFICANTLY REDUCED, EVEN TAKING INTO CONSIDERATION GENERATING STATION EMISSIONS. ALL OF THESE ENVIRONMENTAL BENEFITS WOULD BE ACCOMPANIED BY IMPORTANT ENERGY SECURITY BENEFITS AS WELL, BECAUSE ELECTRICITY FROM DOMESTIC FUEL RESOURCES IS AN ABUNDANT AND STABLE SOURCE OF TRANSPORTATION FUEL.

WE AT PSE&G BELIEVE H.R. 1538 OFFERS A CAREFULLY CRAFTED, COMPREHENSIVE PACKAGE OF INCENTIVES THAT WILL ADVANCE THE DAY WHEN ELECTRIC VEHICLES WILL BE IN WIDESPREAD USE THROUGHOUT THE NATION. I WOULD LIKE TO FOCUS BRIEFLY ON TITLE III OF THE LEGISLATION, WHICH WILL ENCOURAGE THE DEVELOPMENT OF THE INFRASTRUCTURE NECESSARY TO SUPPORT THE USE OF ELECTRIC VEHICLES.

THE NEED TO DEVELOP THE "INFRASTRUCTURE" TO OPERATE, MAINTAIN AND SERVICE ELECTRIC VEHICLES IS BECOMING WIDELY RECOGNIZED. EV TECHNOLOGY IS DIFFERENT FROM WHAT THE AVERAGE DRIVER OR FLEET OPERATOR IS USED TO, AND IT WILL BE NECESSARY TO HAVE A SUPPORT STRUCTURE IN PLACE TO ASSIST OPERATORS IN MAKING THE TRANSITION TO ELECTRIC VEHICLES. QUESTIONS ABOUT VEHICLE RECHARGING, SERVICING, ROUTINE MAINTENANCE, AND BATTERY DISPOSAL WILL ARISE. WE MUST HAVE ANSWERS TO THESE QUESTIONS BEFORE THE PUBLIC WILL FEEL CONFIDENT IN THE USE OF ELECTRIC VEHICLES.

TITLE III OF H.R. 1538 WOULD CREATE TWO INFRASTRUCTURE DEVELOPMENT PROGRAMS. THE SECRETARY OF ENERGY WOULD BE AUTHORIZED TO ENTER INTO AS MANY AS FIVE JOINT VENTURES WITH THE PRIVATE SECTOR FOR COST-SHARED RESEARCH, DEVELOPMENT OR DEMONSTRATION OF INFRASTRUCTURE PROGRAMS OR SYSTEMS FOR ELECTRIC VEHICLES. PROJECTS COULD ADDRESS SUCH DIVERSE ISSUES AS

- EQUIPPING EXISTING GASOLINE STATIONS TO SERVICE ELECTRIC VEHICLES;
- THE INSTALLATION OF CHARGING FACILITIES IN PUBLIC BUILDINGS;
- RATE STRUCTURES DESIGNED TO ENCOURAGE INVESTMENT BY ELECTRIC UTILITIES IN INFRASTRUCTURE-RELATED CAPITAL EQUIPMENT; OR
- PUBLIC EDUCATION PROGRAMS.

JOINT VENTURES SELECTED FOR THIS PROGRAM MUST REPRESENT GEOGRAPHICALLY AND CLIMATICALLY DIVERSE REGIONS OF THE COUNTRY, IN ORDER TO PRODUCE INFORMATION THAT WILL FACILITATE THE USE OF ELECTRIC VEHICLES THROUGHOUT THE NATION. THE PRIVATE SECTOR MUST PROVIDE SUBSTANTIAL SUPPORT -- AT LEAST 50 PERCENT OF THE COSTS -- TO LEVERAGE THE FEDERAL FUNDS THAT WOULD BE MADE AVAILABLE UNDER THE LEGISLATION.

H.R. 1538 ALSO RECOGNIZES THAT STATE AND LOCAL GOVERNMENTS PLAY A KEY ROLE -- IN MANY RESPECTS A LEADING ROLE -- IN THE EFFORT TO GET ALTERNATIVELY FUELED VEHICLES ONTO THE ROADS. THE FEDERAL GOVERNMENT SHOULD ENCOURAGE ALL STATES TO CRITICALLY EVALUATE THE

PROSPECTS FOR THE USE OF NOT ONLY ELECTRIC VEHIC ES, BUT ALSO OTHER CLEAN ALTERNATIVE FUEL VEHICLES. H.R. 1538 WOULD MAKE FEDERAL INFORMATION AND TECHNICAL AND GRANT ASSISTANCE AVAILABLE TO STATES THAT DEVELOP AND RECEIVE APPROVAL OF VOLUNTARY ELECTRIC VEHICLE AND OTHER CLEAN ALTERNATIVE FUEL VEHICLE INCENTIVE AND IMPLEMENTATION PLANS TO ASSURE INTRODUCTION OF ELECTRIC VEHICLES AND OTHER CLEAN ALTERNATIVE FUEL VEHICLES INTO THE STATE BY THE YEAR 2000.

THE INFRASTRUCTURE PROGRAM OF TITLE III, COUPLED WITH THE TECHNOLOGY R&D AND MARKET STIMULATION ACTIVITIES CALLED FOR UNDER THE LEGISLATION, WILL BEGIN TO PROVIDE ANSWERS TO MANY OF THE QUESTIONS THAT THE DRIVING PUBLIC AND OTHERS HAVE CONCERNING ELECTRIC VEHICLES.

THE REAL TEST FOR ELECTRIC VEHICLES WILL COME NOT IN THE LABORATORIES OR THE TEST TRACKS, BUT IN THE MARKETPLACE. CHALLENGES REMAIN WITH RESPECT TO ADVANCING AND PERFECTING ELECTRIC VEHICLE AND BATTERY

TECHNOLOGIES, AND THE NATIONAL ELECTRIC VEHICLE ACT WILL HELP US TO MAKE SIGNIFICANT PROGRESS IN THESE AREAS. THE STRENGTH OF H.R. 1538, HOWEVER, LIES IN THE FACT THAT IT GOES BEYOND TECHNOLOGY DEVELOPMENT TO ADDRESS THE PROBLEMS IN INFRASTRUCTURE AND MARKET DEVELOPMENT THAT MUST BE RESOLVED BEFORE ELECTRIC VEHICLE TECHNOLOGY WILL BE ACCEPTED. GOVERNMENT AND INDUSTRY MUST WORK TOGETHER TOWARD THESE GOALS, AND H.R. 1538 PROVIDES THE NECESSARY FRAMEWORK FOR THIS COOPERATION.

IN SUM, FROM OUR PERSPECTIVE IN NEW JERSEY, WE BELIEVE THAT ELECTRIC VEHICLES CAN PLAY A SIGNIFICANT ROLE IN IMPROVING AIR QUALITY. WE STRONGLY SUPPORT H.R. 1538 AS A CATALYST TO INCREASED DOMESTIC ELECTRIC VEHICLE PRODUCTION AND DISTRIBUTION.

I WILL BE PLEASED TO ANSWER ANY QUESTIONS YOU MAY HAVE.

Mr. SCHEUER. Thank you very much.
And now we'll hear from Mr. Vern Pruett.
Please proceed, Mr. Pruett.

STATEMENT OF VERN PRUETT, ENGINEER - SYSTEMS DEVELOPMENT, LOS ANGELES DEPARTMENT OF WATER AND POWER, LOS ANGELES, CALIFORNIA

Mr. PRUETT. Mr. Chairman, Members of the subcommittee, I appreciate this opportunity. My name is Vern Pruett. I'm the engineer in charge of Conservation and Planning Division at the City of Los Angeles Department of Water and Power.

I'm going to summarize the key points submitted in my written testimony and let you know that we strongly endorse the provisions of H.R. 1538 and we would like to take this opportunity to express our appreciation to you, Mr. Chairman, and the many other members of the subcommittee who have joined with Congressman Brown in cosponsoring this important initiative.

In Los Angeles last year, which was a relatively good year, the LA air basin exceeded Federal ozone standards on 130 days. Federal ambient standards for carbon monoxide, fine particulate matter, and nitrogen oxide were also exceeded. And this occurred despite the fact that LA has the most stringent air quality regulations in the country, if not the world.

We have taken enormous strides to control air quality, and our department has managed to reduce air emissions from its in-basin power-generating plant by more than 90 percent over the last 20 years. Power plants in the LA basin now contribute less than 1 percent of total air emissions; nevertheless, we expect to reduce emissions an additional 80 percent over the next 10 years.

We have been running hard, at best, but our local air quality is essentially standing still. The automobile, Mr. Chairman, is the key to making real and sustained progress toward better air quality in the urban nonattainment areas, including Los Angeles.

Motor sources such as cars, trucks, and buses, now contribute about two-thirds of all the pollutants and about 50 percent of the hydrocarbon emissions in our basin. By the year 2010 the number of vehicle miles traveled locally will increase from about 275 million miles a day currently to approximately 400 million miles a day.

These statistics are extremely ominous to those of us that have to breathe the air in the LA air basin, yet these statistics, evidencing the tremendous impact that automobiles can and will have on our environment, demonstrate the great potential for cleaner air through conversion to pollution-free electric vehicles.

It is this huge potential for air quality improvements and our keen interest in pursuing innovative technology that are the foundation for our support, involvement, and initiatives such as embodied in H.R. 1538.

While we support all the provisions of this legislation, I would like to focus my remarks on title two of the bill that would establish electric vehicle commercial demonstration programs. These programs could be extremely helpful in assuring the success of

electric vehicle commercialization efforts already underway in the LA basin.

This Federal program could be important to ongoing efforts in the LA basin to get electric vehicles onto our roadways. Federal funding through this program could assist in assuring the success of the Los Angeles program known as the LA electric vehicle initiative. It was begun in late 1988 with the goal to place 10,000 commercial electric vehicles on Southern California roadways by 1995. The 10,000 vehicles are a minimum requirement, but many times that number are contemplated by the year 1995.

You may find it interesting that these vehicles are being designed to be fully functional, safe, freeway-capable, and driver-friendly. Full service dealer infrastructures, including sales, service, warranties, and financing are integral to the Los Angeles program. Customer acceptance and satisfaction are primary goals of our program.

Additionally, our vehicle specifications are a range up to 150 miles, 70 miles per hour speed, 0 to 60 miles per hour in 5 seconds. We're talking about four-passenger vehicles with power steering, power brakes, and air conditioning. And we are underway now.

We have two selected companies—Clean Air Transport, based in Sweden and England; and Unique Mobility of Englewood, Colorado. These two companies are now at work to meet the goals of the LA initiatives. Clean Air Transport is on schedule and expected to have a ground-up, purpose-built electric four-passenger vehicle ready for the market by early 1993. Unique Mobility has just completed a feasibility study for producing a shuttle vehicle or cargo van.

Our department has committed $12 million over the next three years to support the initiatives. This amount provides the necessary seed money for early development work being done by these two selected manufacturers; however, Federal funding provided under the proposed legislation and directed towards the anticipated price differential will greatly assist in assuring the ultimate success of our initiative.

A partnership between Federal Government, local government, and private industry which could be created under the commercial demonstration program included in this legislation affords us the greatest potential for achieving our goals of cleaner air through conversion of a significant portion of vehicles to electric power in the near term.

The funding and caps provided in this bill will provide the necessary market incentive for 3,000 to 10,000 commercial electric vehicles, by our estimation.

I thank you for the opportunity to appear and present our program and views.

[The prepared statement of Mr. Pruett follows:]

FINAL

Statement of Vernon L. Pruett
Engineer of Conservation and Planning
Los Angeles Department of Water and Power

before the

Subcommittee on Environment
Committee on Science, Space and Technology
U.S. House of Representatives

May 16, 1991

Mr. Chairman and members of the Subcommittee, I appreciate the opportunity to appear before you. My name is Vern Pruett, and I am the Engineer of Conservation and Planning for the Los Angeles Department of Water and Power. I appear today with my colleagues as both a spokesman for my company and for the Electric Transportation Coalition.

The Department strongly endorses the provisions of H.R. 1538, the National Electric Vehicle Act of 1991. And, we would like to take this opportunity to express our appreciation to you, Mr. Chairman, and to the many other members of this Subcommittee who

have joined with Congressman Brown in cosponsoring this important initiative.

The Department of Water and Power is the largest unit of municipal government in Los Angeles. We have a workforce of approximately 11,000 providing electricity and water for some 3.4 million people covering a service area of 465 square miles. We are the largest municipal utility in the United States. As you may also know, we service an area that has the most serious air quality problem in the country. While we are not alone -- some 80 metropolitan areas across the nation have similar air quality problems -- we are unique in terms of the gravity and enormity of the problem.

Last year the L.A. Basin exceeded the federal ozone standard on 130 days, and federal ambient standards for carbon monoxide, fine particulate matter, and nitrogen dioxide were also exceeded. This occurred despite the fact that L.A. has the most stringent air quality regulations in the country if not the world.

We have taken enormous strides to control our air quality problem. The Department has managed to reduce air emissions

(NOx) from its in-Basin power generating plants by more than 90 percent over the last 20 years and we will reduce emissions an additional 80 percent over the next ten years. Power plants in the L.A. Basin contribute less than one percent of total air emissions. We have been "running hard" but -- at best -- we are "standing still" in our struggle to attain clean air. The automobile, Mr. Chairman, is the key, to making real and sustained progress toward better air quality in the Basin.

Motor sources (cars, trucks, buses), now contribute about two-thirds of all of the pollutants and about 50 percent of the hydrocarbon emissions in the Basin. Looking ahead, demographers tell us there will be one new automobile on our already-choked freeways for every four that travel the LA freeways today. By the year 2010, the number of vehicle miles traveled locally will increase from about 275 million a day currently to approximately 400 million per day. These statistics are extremely ominous to those of us who have to breathe the air in the L.A. Basin.

Yet, these statistics --evidencing the tremendous impact that automobiles can and will have on our environment --demonstrate the

great potential for cleaner air through conversion to pollution-free, electric vehicles. It is this huge potential for air quality improvements, and our keen interest in pursuing innovative technology, that are the foundation for our support and involvement in initiatives such as that embodied in H.R. 1538. While we support all of the provisions of this legislation, I would like to focus my remarks on Title II of the bill that would establish electric vehicle commercial demonstration programs. These programs could be extremely helpful in assuring the success of electric vehicle commercialization efforts already underway in the L.A. Basin.

Title II of the legislation creates a program to provide $50 million in federal cost-sharing to as many as 10 commercial demonstrations of large numbers of electric vehicles in non-attainment areas or in populated metropolitan areas of at least 200,000. The federal funding would be used to "buy down" the cost of an electric vehicle. This cost is expected to be greater than a comparable gasoline-powered vehicle during the early stages of production. This financial assistance is critical to efforts by those of us in the L.A. Basin, and others around the country, who are attempting to "jump start" commercialization of

electric vehicles and get these environmentally important vehicles onto our roadways.

There is virtually no market for electric vehicles currently because of the substantial price premium associated with the start-up of this industry (and low-volume production). By providing federal assistance to lower the initial selling price of electric vehicles, one increases the likelihood of potential purchases. We believe that the purchase and use of electric vehicles through federal demonstration projects will provide the actual, on-the-road data that is imperative to building consumer confidence in the technology and its performance, thereby assuring its acceptance in the marketplace.

I mentioned that this federal program could be important to on-going efforts in the L.A. Basin to get electric vehicles onto our roadways. Federal funding through this program could assist in assuring the success of the Los Angeles program. It is known as the L.A. Initiative and was begun in late 1988 with the goal to place 10,000 electric vehicles on Southern California roadways by 1995. The L.A. Initiative, authored by City Councilman Marvin Braude, authorized City sponsorship of an international competition for private

companies to develop, produce and market EVs. The Department was given the task of implementing this Initiative. By October, 1989, two companies had been selected from 19 replies to our formal request for proposals to produce 10,000 EVs for sale and distribution in Southern California.

The two selected companies, Clean Air Transport (based in Sweden and England) and Unique Mobility, Inc. (of Englewood, Colorado) are now at work to meet the goals of the L.A. Initiative. CAT is on schedule and is expected to have a "groundup" electric passenger vehicle ready for the market by early 1993. Unique Mobility has just completed a feasibility study for producing a shuttle vehicle and/or cargo van.

The Department has committed over $12 million over the next three years to support the L.A. Initiative. This amount provides seed money for early development work being done by the two selected manufacturers.

Federal funding, provided under the proposed legislation, directed toward the anticipated price differential, could greatly assist in assuring the success of the Initiative once this development work is

done. A partnership between the federal government, local government and private industry -- which could be created under the commercial demonstration program included in H.R. 1538 -- affords us the greatest potential for achieving our goals of cleaner air through conversion of a significant portion of vehicles to electric in the near term. The crafters of H.R. 1538 wisely recognize that we -- government at all levels and private industry -- must work cooperatively in order to assure that the nation reaps the benefits of a successful commercial launch of electric vehicles.

Although our comments have emphasized support for Title II of the bill, I would also like to express our support for Title III which concerns electric vehicle infrastructure. The City of Los Angeles is taking steps to provide the necessary infrastructure to help facilitate the commercialization of electric vehicles in the L.A. Basin. These steps include; electric rate incentives, building code modifications to accommodate charging, zoning changes for electric vehicle "filling stations," curbside parking/charging and preferred parking spaces for electric vehicles.

Thank you for the opportunity to appear before this Subcommittee.

Mr. SCHEUER. Thank you very much.

A few questions. Mr. Bryan, PG&E is involved in the development of both compressed natural gas vehicles and electric vehicles; is that correct?

Mr. BRYAN. That's correct, Mr. Chairman.

Mr. SCHEUER. Are these competing markets, or are they the same market? Is there a discreet market for electric and a discreet market for compressed natural gas?

Mr. BRYAN. Yes. We see that there are two different market sectors.

Mr. SCHEUER. Could you define those two markets?

Mr. BRYAN. Yes. I think that the compressed natural gas you will see in light- through medium-duty trucks, buses, and vans primarily, and perhaps full-sized sedans. Electric vehicles we see in the light, inner-urban delivery van and the smaller car. So we see them as two separate market sectors. There may be some overlap in the van sector, but clearly distinct places for both.

Mr. SCHEUER. Very good.

Now for the panel—anybody, including Mr. Bryan—do you believe that electric vehicles can be commercialized and widely accepted by the market out there by the turn of the century?

Mr. STEINKE. I'd like to answer for our company. Yes, we do. The widely accepted is up to us, really, in funding and helping to support the industry. If the industry doesn't get that support, it might not happen as quickly.

We have an environmental problem out there, and the problem will be solved with the electric vehicle if we get behind it.

Yes, I think it will be a commercial and very viable business and industry by the year 2000.

Mr. BRYAN. Could I just add one thing?

Mr. SCHEUER. Yes.

Mr. BRYAN. I know Mr. Baker from General Motors talked a lot about the interest in the marketplace. I have actually detected a next shift beyond that with consumers that are irritated that we are not making these environmentally superior vehicles available. "Why don't you do it now? What's holding you back?"

I really believe that if we can produce acceptable performance we will be able to sell those vehicles.

Mr. SCHEUER. Who is going to do the research on the vehicles once we get the battery? The research on the vehicles, the production of the vehicles, the marketing of the vehicles?

Mr. BRYAN. I think the auto companies clearly are going to have to design the rolling platforms, but I think there is a role in the utility company to work with the infrastructure to be sure that it is compatible with those cars. Will they connect up? What's the effect on our grid of having multiple battery chargers connected in? Testing those vehicles—some of the early entry prototypes need to be tested with the utility companies so that we can see that the performance that is talked about is actually achieved.

So I think it is going to be the actual rolling platform will be the auto companies, and then there is a cooperative effort to test those vehicles in the marketplace. It will be a combination of them and the utilities.

Mr. SCHEUER. Do you see any problem in this cooperative effort in the marketplace between utilities, I take it—

Mr. BRYAN. Yes.

Mr. SCHEUER.—and also all the utilities and the manufacturers? Do you see any antitrust problems in your working together and planning together and maybe merchandising and selling together?

Mr. BRYAN. No, I don't, Mr. Chairman, particularly on the utilities side, of course, since most of us have franchised areas that reduces some of the antitrust.

Mr. SCHEUER. Yes.

Mr. BRYAN. And we're open to any manufacturers who have vehicles to test. We have now been approached by the American manufacturers, and we're very interesting in working with them, but I think if other vehicles come into the marketplace we're willing to work with those manufacturers and test their vehicles, as well.

Mr. STEINKE. I might add—

Mr. SCHEUER. If they came from Japan or Holland or wherever?

Mr. BRYAN. Yes, sir.

Mr. SCHEUER. Yes.

Mr. STEINKE. I might add, Mr. Chairman, in our gas business we service all major gas appliances for our customers. We provide that service. We work with the appliance manufacturer, as well as the customer, and bridge that gap very nicely and it works very well.

Mr. SCHEUER. Very good.

Mr. Pruett, is the city of Los Angeles planning to make any changes in the infrastructure of that city to support electric vehicles?

Mr. PRUETT. Yes, we are. We're looking at the necessary infrastructure, including special meters, hookups, standardized plugs, rates and billing, and those sort of things that are all essential pieces of our infrastructure, in addition to the dealer infrastructure that we are also working on.

Mr. SCHEUER. Mr. Greco, you have expressed concerns about the number of 100, the demonstration vehicles that would be produced under the terms of H.R. 1538, the demonstration program. What number would you recommend?

Mr. GRECO. I think that the number shouldn't be specified. My particular concern—

Mr. SCHEUER. You think the numbers—

Mr. GRECO. Should not be specified. My particular interest and concern is that the market is very different depending on the type of vehicle and the area you are supplying that vehicle to. When you're talking about small automobiles, what have you, those type vehicles, certainly larger quantities are appropriate. But if you are talking about minibuses, delivery vans, I think smaller manufacturer, a Winnebego, what have you, might be able to deal in a very small group of 10, 15, and deal with a very good demonstration of that type of product.

That leads me back to some comment I wanted to make relative to the marketplace. I think we have to look at the electric vehicle marketplace as filling a niche. It may not be the same type of—may have the same capabilities of a gasoline-powered vehicle. It may be limited range, what have you. We've got to find the niches

that it can work and gear the market to those niches. I think especially in the early stages of development that's where to go—in places where it can work.

Mr. SCHEUER. Okay. This was a very interesting panel, thoughtful, provocative, and we appreciate your patience and tolerance for the untimely delay. I hope you'll agree it was for a noble cause.

Thank you very much.

We'll now hear the last panel on research: Alan Krupnick and Jim MacKenzie. Please step forward.

We're delighted to have you. We thank you for your patience. We're running way late, as you understand. We're operating under a strict five-minute time table, but your prepared remarks will be printed in full in their entirety at the point at which you testify. Okay? All right.

Let's hear from Mr. Alan Krupnick, Senior Fellow, Quality of Environment Division of Resources for the Future.

Please proceed.

STATEMENT OF ALAN KRUPNICK, SENIOR FELLOW, QUALITY OF ENVIRONMENT DIVISION, RESOURCES FOR THE FUTURE, WASHINGTON, D.C.

Mr. KRUPNICK. Thank you, Mr. Chairman, for inviting me to speak and submit written testimony on this important effort to commercialize electric vehicles.

I have submitted for the record the results of a study performed by Ted Russell, Hadi Dowlatabadi of Carnegie-Mellon, and myself on the emissions reductions and ambient ozone improvements that can be expected from substitution of electric vehicles, EVs, for gasoline vehicles. In this testimony I will briefly summarize our findings and offer comments on H.R. 1538.

The findings of our detailed modeling study for Los Angeles show that a 5 to 15 percent penetration of electric vans and autos built around the Chrysler TE van powered by nickel iron batteries would significantly reduce hydrocarbons, nitrogen oxides, carbon monoxide, carbon dioxide, and benzene emissions in LA, as well as reducing ambient ozone concentrations and exposures. These results are independent of how and where the electricity for charging the batteries is generated and obtained, even if the EVs replace advanced gasoline or methanol vehicles.

Particulates and sulfur dioxide emissions may increase, however, because gasoline and methanol vehicles emit such small amounts of these pollutants relative to power plants. The effects of penetration of EVs in other areas depend on the types of plants providing the incremental power for charging.

Turning to the provisions of H.R. 1538, I support the funding of R&D efforts on the batteries, though the EV demonstrations—I question a bit more subsidizing them. Just because EVs are one promising means of improving air quality and reducing oil use doesn't automatically mean that their production should be subsidized. It would be better for energy prices to reflect the unpriced environmental and other effects of energy and let the alternate fuel vehicles compete in the market. I think EVs would do well on that kind of playing field.

Turning to EVs specifically, life cycle cost analyses of these vehicles, of course, are highly uncertain, but they do suggest that even with current technology EVs could be cost competitive with gasoline vehicles over the lifetime of the vehicle, although the EV purchase price obviously would be a lot higher.

Furthermore, regulatory initiatives in California and through the Clean Air Act are creating captive markets for these vehicles and, in addition, each of the major auto companies and the Advanced Battery Consortium that we have heard about today are moving ahead with R&D efforts on their own and even demonstration programs.

So with these initiatives underway and given the many approaches to improving urban air quality and reducing energy use that are promising but under-funded, (such as programs for the early retirement of dirty vehicles), I wonder if EVs warrant this degree of special treatment.

Even if the answer is yes, the subsidy provisions in title two should be designed to foster EVs that are reasonably cost competitive with alternative types of vehicles. This is necessary if they are to make major inroads into the cities.

H.R. 1538 attempts to do this, but it goes, I think, overboard in guaranteeing this cost competitiveness in terms of retail prices of the vehicles. By subsidizing the difference between the EV retail price and that of a comparable gasoline vehicle, there is no incentive provided to the EV producer for designing and demonstrating a cost- competitive vehicle. Indeed, this program could skew research towards producing vehicles with attractive but overly costly performance characteristics. Once the subsidy is removed, the vehicles might be too expensive to compete.

A better idea for a vehicle-based subsidy is to make a lump sum payment to the producer for each vehicle sold. The amount of the payment could bet set by relying on a study estimating this retail price differential or a life cycle cost differential, and then producers would be free to set any price they wanted on the vehicle.

With this plan, they have the incentive to make a cheaper vehicle competing on price as well as vehicle characteristics. The more they sell, the more money they get to keep. If they could produce an EV with the same retail price as a gasoline vehicle, for instance, they could keep the entire subsidy.

One final point. The bill calls for a survey of transportation demand. As the last major study that would be useful to economists was in 1983 by the Federal Highway Administration, a new study is much needed to estimate the cost effectiveness of EVs and other options for improving urban air quality and reducing oil demand. It would be desirable to couple the call for a survey with the requirement that a cost effectiveness analysis be undertaken on a host of other options, such as alternative transportation control measures.

I single out these transportation control measures because their benefits can be delivered in the near and medium term, while EVs and other alternate fuel vehicle options, which are dependent on vehicle turnover to work, can potentially provide benefits only in the longer term.

Thank you very much.

[The prepared statement of Mr. Krupnick follows:]

Testimony of Alan J. Krupnick, PhD
Senior Fellow, Resources for the Future, Washington, D.C.
Before the Subcommittee on Environment,
Committee on Science, Space, and Technology,
U.S. House of Representatives,
May 16, 1991

Thank you for inviting me to speak and submit written testimony on this important effort to commercialize electric vehicles (EVs). I have submitted for the record the results of a study performed by A. Ted Russell, Hadi Dowlatabadi (of Carnegie-Mellon University) and myself on the emissions reductions and ambient ozone improvements that can be expected from substitution of electric vehicles for gasoline vehicles. In this testimony I will briefly summarize our findings and offer comments on H.R. 1538.

The findings of our study, which was supported by the Electric Power Research Institute and the South Coast Air Quality Management District, are based on a detailed air quality model of the Los Angeles (LA) area during a three-day smog episode and a model of the dispatch of electric power at least cost from plants located both inside and outside the basin. We find that a 5 to 15% penetration of electric vans and autos built around the Chrysler TEVan and powered by nickel-iron batteries, would significantly reduce hydrocarbons, nitrogen oxides (NO_x), carbon monoxide (CO), carbon dioxide (CO_2) and benzene emissions in Los Angeles. This result is independent of how and where the electricity for charging the batteries is generated and even if the EVs replace advanced gasoline or methanol (M85) vehicles. The effects on particulates and sulfur dioxide emissions are less clear, because gasoline and methanol vehicles emit such small amounts of these pollutants.

LA air quality would improve, over the year resulting in about a 20% reduction in number of days exceeding the ozone standard in 2010, even if power were generated within the basin. This is so because natural gas-fired plants -- which are relatively clean -- generate the power. However,

other areas that rely on a dirtier mix of fuels to generate electricity could do worse than LA for a similar penetration of EVs. The issue is what types of plants will be used to provide the incremental power for night-time charging. Generating electricity by existing coal-fired power plants will raise sulfur dioxide (SO_2), particulate, NO_x, and CO_2 emissions. We also found that for rural areas downwind of cities with EVs, ozone levels could fall even if power plants that charge the EVs are located there.

One surprising result is that ozone concentrations in the LA basin are lower when all the EVs are powered by newly constructed in-basin plants than when some of this demand is met by existing plants in basin and the rest is met by imported power. This result occurs because the new plants are very clean and reduce the load met by existing dirtier facilities throughout the day.

Our study thus finds that EVs contribute to ozone reductions but that the effects on SO_2, NO_x, particulates, and CO_2 depend on the generation technology used to charge the batteries. If coal supplies this power, which it might where baseload technologies are used for charging (filling in the trough of the load curve), then net emissions of these pollutants could rise.

However large the benefits of EVs, they won't be realized unless this penetration actually occurs. HR 1538 is designed to help this process along by subsidizing research, development, and demonstration projects involving EVs. While I applaud the idea of subsidizing research and development of technologies, I am concerned about subsidization of demonstration projects, in general, and the specific means proposed to confer this subsidy in particular. First, it is not clear to me that any subsidy of these vehicles is required for their commercialization. Life-cycle cost analyses of these vehicles are highly uncertain, but a recent analysis concluded that with current technology they could be cost-competitive with gasoline vehicles over the vehicles' lifetimes, although the EV purchase price (including the battery) will be higher. Furthermore, regulatory initiatives -- California low-emissions vehicle program and the requirement in the Clean Air Act Amendments of 1990 that fleet vehicles be

very lov emitting -- are creating captive markets for these vehicles. In addition, Ford recently announced that it plans to build 70-100 vehicles for a demonstration program, with 10 of these paid for by Southern California Edison. Other companies are planning similar programs. And the advanced battery consortium of major vehicle manufacturing companies is working on these technologies. With these initiatives under way, and given the myriad approaches to improving urban air quality that are promising but underfunded (such as programs for the early retirement of "dirty" vehicles), do EVs warrant this degree of special treatment?

While people could disagree on whether any subsidy is needed, we can all agree that the EV needs to be cost competitive with alternative types of vehicles if it is to make major inroads into our cities. H.R. 1538 attempts to do this. Unfortunately, it goes overboard in guaranteeing this cost competitiveness in terms of retail prices of the vehicles. By subsidizing the difference between the EV retail price and that of a comparable gasoline vehicle, there is no incentive provided to the EV producer for designing and demonstrating a cost-competitive vehicle. Indeed, this program could skew research towards producing vehicles with attractive, but overly costly, performance characteristics. Once the subsidy is removed, such vehicles could be too expensive to be compete.

A better idea for a vehicle-based subsidy is to make a lump sum payment to the producer for each vehicle sold. The amount of the payment could be set according to a study estimating the retail price or, even better, the expected lifecycle cost differential between an EV and a gasoline vehicle (GV). Producers would be free to set any price they wanted on the vehicle. But under this plan, they have the incentive to make a cheaper vehicle, competing on price as well as vehicle characteristics. The more they sell, the more money they keep. If they can produce an EV with the same retail price as a GV, they can keep the entire subsidy.

Note that I favor making the lump sum per vehicle subsidy equal the difference in estimated <u>lifecycle</u> costs, appropriately discounted, rather than the retail price differential because both retail price and operating cost differentials are part of the consumer's concern. At the same time, it should be recognized that the average consumer is likely to be risk-

averse to new technology and that extra incentives may therefore be needed to induce purchase of an EV. Thus, the lump sum payment should probably exceed the lifecycle cost differential (if it exists) and perhaps, even the retail price differential. The important concept, however, is to break the tie between the price of the EV and the amount of the subsidy.

One final point. H.R. 1538 calls for a survey of transportation demand. As the last major study was in 1983, a new study is much needed. To estimate the cost-effectiveness of EVs and other options for improving urban air quality, it would be desirable to couple the call for a survey with a requirement that the cost-effectiveness of a host of options, such as alternative transportation control policies, be assessed. I single out transportation control options because their benefits can be delivered in the near and medium term, while EVs and other alternate-fuel vehicle options, being dependent on turnover of the vehicle stock, can potentially provide benefits only in the long term.

Mr. SCHEUER. Thank you very much, Mr. Krupnick.
Jim MacKenzie?

STATEMENT OF JIM MAC KENZIE, SENIOR ASSOCIATE, WORLD RESOURCES INSTITUTE, WASHINGTON, D.C.

Mr. MACKENZIE. Thank you, Mr. Chairman. My name is Jim MacKenzie. I'm a Senior Associate at the World Resources Institute, and I appreciate the opportunity to appear today.

As you have indicated and as the bill summarizes, motor vehicles are an important part of national problems, including: clean air, oil security, and climate change. In this respect the National Energy Strategy fails to deal effectively with transportation. CV/CO2/CO_2/ emissions are to go up in the National Energy Strategy, imports would go up—it doesn't address the problem.

In a recent study that we did at the World Resources institute we looked at future growth of vehicles worldwide and we found that you cannot improve fuel efficiency fast enough to keep up with the growth, and that carbon dioxide emissions will continue to grow. Our conclusion was that electric vehicles are absolutely inevitable and necessary if we are going to deal with the global warming problem in the transportation sector.

I strongly approve of H.R. 1538. I think it deals with many of the problems that we face in the introduction of these vehicles. These problems have already been mentioned by other speakers—time of charging, time of day use, technology, standardization of plugs, battery recycling, and all of that sort of thing.

Let me make several simple points in support of this. The first is that one talks about alternative fuels to deal with our problems, and in terms of global warming methanol, ethanol, and CNG are basically equivalent to gasoline and are not long-term solutions to that problem. They may have some clean air benefits, but they have little, if any, global warming benefits.

Electric vehicles charged from our present mix would have substantial global warming benefits and, in the longer term, as the utilities move to nonfossil sources, they will reduce the emissions eventually to negligible amounts.

The second one is something that may not come directly under your purview but which I think is essential, which Alan has just mentioned, which is that one of the most important things you could do to make electric vehicles more attractive would be to make gasoline bear the full social cost of everything from war to climate. The Europeans pay, as you indicated, Mr Scheuer, $4 to $5. Their fleets are far more efficient than ours, and in my accompanying report that we issued just last week I show you how the fleets are directly proportional to the fuel prices. That will not only make electric vehicles more attractive; it will make solar energy more attractive, as well.

Mr. SCHEUER. Excuse me. For your information, Lee Iacocca told a number of Congressmen who visited Detroit the week before last that he felt that a much higher gas tax was indicated.

Mr. MACKENZIE. Yes.

Mr. SCHEUER. We asked him if he had said that publicly, and he said no, he hadn't said it publicly but he was telling that to us, and

he said it for the obvious reason that when you have much higher gas prices it concentrates people's minds on buying cars that are fuel efficient. And he recommended a tax—I won't even mention what it was—but phased in over five years. I would recommend that kind of a tax only a larger phase in over ten years so that anybody who would buy a new car would be thinking down the pike, "Well, I'm not going to be hit by that much-increased gas price tomorrow or next year, or perhaps even the year after, but sooner or later it is going to hit and it is going to hurt and I'd better take that in mind in making some of these cost/benefit decisions involved in selecting a more fuel efficient automobile that may cost a little more."

Mr. MACKENZIE. I completely agree, Mr. Chairman.

Let me say that not only does it encourage people to buy more efficient vehicles; it makes them drive more sanely— slower, car pooling, all the sorts of things that make sense.

It also may not be possible that electric vehicles with their expensive batteries will ever be cost competitive with gasoline vehicles at $1 a gallon. Roughly, the fuel prices of electric and gas cars are the same at about $0.035 a mile with gasoline at $1 and kilowatt hour at about $0.07. So if you were to increase the fuel price of conventional vehicles it would definitely make electric vehicles more economically attractive.

The other point which I'd like to emphasize is what Alan just mentioned, and that's on title two. It strikes me as being a rather complicated process having to determine what the price differential is, and I would suggest something along the lines that Alan has suggested, which is that there be a bidding process that DOE undertakes for a given class of vehicles like a four-passenger car electric vehicle.

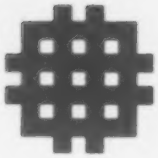
DOE will ask for bids among manufacturers, and they will say that they will produce a certain number of vehicles guaranteed to sell at a certain lump sum subsidy, and they will take care of selling them to fleets, to individuals, to dealers, whoever, and that the DOE then accepts these bids on the lowest subsidy per vehicle.

This would, over the years, give the manufacturers more and more incentive to reduce the costs. It would reduce the paperwork, and I think it would have the same effect of providing the subsidy. This is similar to what Los Angeles is doing in providing a lump sum to the manufacturer, and I think it is administratively simpler to deal with.

Finally, the Federal purchase program by the Federal fleet I think is a very important measure. The non-military vehicles number about 335,000. There is an enormous potential there for phasing in purchases of electric vehicles by the Federal Government, recognizing the benefits that they give to the environment and creating a market pool.

This completes my testimony. I strongly endorse the bill.

[The prepared statement of Mr. MacKenzie follows:]



WORLD RESOURCES INSTITUTE

1709 New York Avenue, N.W., Washington, D.C. 20006, Telephone: 202-638-6300
Facsimile: 202-638-0036 Telex: 64414 WRIWASH Direct Dial: (202) 662-

TESTIMONY OF
James J. MacKenzie, Ph.D.
Senior Associate
Climate, Energy, and Pollution Program
on H.R. 1538
The National Electric Vehicle Act of 1991

Before the
Subcommittee on Environment
Committee on Science, Space, and Technology
U.S. House of Representatives

May 16, 1991

ABSTRACT

Oil-powered motor vehicles are major elements in the United States's pollution, climate, and security problems. The National Energy Strategy fails to adequately address our climate and security problems. Methanol, compressed natural gas, and ethanol are not inherently "clean fuels" and would do little to reduce the threat of global warming. Only electric and hydrogen vehicles, eventually powered by non-fossil energy sources, offer a long-term hope to cut air pollution, reduce oil imports, and curb global warming. H.R. 1538 is an excellent means for accelerating the introduction of electric vehicles. However, Title II of this bill, authorizing a demonstration program, seems unduly complicated. An alternative, simplified bidding process among manufacturers designed to reduce EV selling prices is suggested.

Thank you, Mr. Chairman. My name is James MacKenzie and I am a senior associate in the Climate, Energy, and Pollution program at the World Resources Institute. The World Resources Institute is an non-profit, independent research and policy institute focusing on issues of environment, resources management, and sustainable development.

I would like to thank you for the invitation to appear before your today to discuss way of accelerating the introduction of electric vehicles (EVs).

Motor vehicles are important elements of several of our national problems including air pollution (smog and carbon monoxide), increasing dependency of foreign imports (vehicles account for about half of U.S. oil consumption), and global climate change (they account for about a fourth of U.S. carbon dioxide emissions.)

While Congress and the Administration have addressed the clean air problem through the recent amendments to the Clean Air Act, neither has addressed in a comprehensive way the problems of dependency on foreign oil or global warming. By its own admission, the President's National Energy Strategy would lead to a 60 percent increase in oil imports over today's levels by 2030 and to a 25 percent increase in carbon dioxide emissions by 2010.

In the few minutes that I have this morning I hope to show that electric vehicles are by far the most promising near-term option to deal with these linked problems. This being the case, it is essential that the Nation begin taking serious steps toward their widespread introduction.

ALTERNATIVE FUELED VEHICLES

Today, there are no widely available substitutes for petroleum-based motor-vehicle fuels. To increase energy security and improve air quality, policymakers are considering a number of potential alternative motor vehicle fuels. Chief among these are methanol, compressed natural gas, ethanol, electricity, and hydrogen. These various energy forms differ from each other in many important respects. Some can be produced domestically while others would be imported. Their overall environmental impacts range from positive to damaging, in some cases more damaging than petroleum. These are by no means equally attractive as solutions to our national problems. Yet, these critical distinctions are often papered over in policy debates over which of these fuels ought to get the most support as a substitute for oil. In my opinion, a comparison of these alternative fuels -- taking into account all of their pros and cons -- clearly demonstrates that methanol, ethanol, and compressed natural gas can play only limited, transitional roles in solving our security, pollution, and climate problems.[1] For these reasons, electric vehicles, and, perhaps further down the road, hydrogen vehicles[2] are the most promising long-term options for ground transportation. Before discussing the problems related to the introduction of electric vehicles let me briefly summarize why methanol, compressed gas, and ethanol vehicles are inadequate solutions to our vehicle-related problems.

METHANOL

Methanol is an alcohol fuel that can be made from almost any feedstock containing carbon, including natural gas, coal, and wood. Natural gas is by far the cheapest source for making methanol.

Methanol has been dubbed a "clean fuel" and methanol vehicles have been widely promoted on the grounds that they would improve urban air quality and increase national security by cutting oil imports. Potential clean-air benefits of a shift from gasoline to methanol blends are quite uncertain. Estimates of the impacts on concentrations of ground-level ozone -- the main ingredient of smog -- vary from a 40-percent decrease to a 20-percent increase. The wide range reflects a lack of firm data on future emissions from methanol-powered vehicles and tomorrow's conventionally powered cleaner cars. Under optimistic

---

[1] For a discussion of the relative merits of alternative fuels, see "Reducing U.S. Reliance on Imported Oil: An Assessment of Alternative Transportation Fuels," James J. MacKenzie, World Resources Institute, October 1990.

[2] "Solar Hydrogen, Moving Beyond Fossil Fuels," Joan M. Ogden, Robert H. Williams, World Resources Institute, October 1989.

assumptions, however, reductions in ozone concentrations of no more than a few percent could be expected by the early part of the next century.

For economic reasons, methanol for transportation would be imported. The price of the natural gas feedstock from foreign suppliers would be substantially less than from domestic sources. Hence, there would be little benefit to our balance of trade problem from a methanol import program

Various studies have shown that displacing petroleum with methanol made from natural gas would have about the same global warming impact as gasoline vehicles. If, for national security reasons, methanol -- or any other fuel, for that matter -- were made from domestic coal, greenhouse gas emissions per mile driven would increase dramatically because of the high carbon dioxide emissions at the coal-to-fuel conversion plant. In sum, the use of methanol is unlikely to alleviate our balance-of-payments, global warming, or air pollution problems.

COMPRESSED NATURAL GAS (CNG)

Because dual-fuel CNG vehicles are more expensive to build than comparable gasoline-powered vehicles -- the present cost to retrofit a car or light truck so that it can run on either CNG or gasoline is about $1500 -- compressed natural gas must cost substantially less than gasoline to be economically attractive. Although natural gas can be imported in a liquid form (LNG), the energy and economic costs of doing so are quite high. For this reason CNG vehicles in the United States are most likely to be fueled domestically or by natural gas imported via pipeline from Canada. Given these circumstances, the use of CNG vehicles could improve national security somewhat, although the balance of trade might not improve.

CNG vehicles would have mixed impacts on air pollution. They emit less carbon monoxide and particulates than gasoline-powered vehicles, but tend to emit more nitrogen oxides. Overall, they might reduce ozone concentrations somewhat. Perhaps the greatest clean-air benefit would come in bus and truck use: CNG heavy-duty engines produce no sulfates, smoke, or particulates. Greenhouse gas emissions from duel-fueled CNG cars are comparable to those of gasoline-powered vehicles; emissions from heavy-duty vehicles are slightly greater than those from diesel-powered vehicles.

In short, CNG could result in some security benefit but little reduction in the trade deficit. Used in trucks and buses in polluted urban areas, CNG would improve air quality somewhat. There would be little change in greenhouse gas emissions or in overall costs; as a result CNG is not a long-term alternative to oil.

ETHANOL

In the United States, ethanol is made from corn and is blended with gasoline in a one-to-nine ratio to make "gasohol." Currently, about 850 million gallons of fuel ethanol are mixed with gasoline each year. In terms of energy, ethanol by itself meets only a tiny portion (about 0.5 percent) of the country's gasoline needs. Over 95 percent of U.S. fuel ethanol is made from corn, requiring about 4 percent of the nation's corn crop. According to the Department of Agriculture, ethanol production in excess of 4 to 5 times this level (supplying the energy equivalent of 2 to 3 percent of present gasoline needs and requiring 16 to 20 percent of the corn crop) would push corn and ethanol prices upward.

The impacts of ethanol blends on air pollution are marginal. While ethanol blends may slightly reduce carbon monoxide emissions from older cars, their overall impacts on smog levels are expected to be negligible and nitrogen oxide emissions could well be higher. Estimates of the net greenhouse impacts of ethanol are subject to great uncertainty and depend on assumptions about how efficiently the corn is grown and processed, what fuels are used in distillation, and what energy credits are taken for by-products (such as animal feeds) of ethanol production. However, recent analyses suggest that greenhouse emissions from ethanol vehicles would be at least as great as those from conventional vehicles. (If ethanol were made from herbaceous crops rather than corn, greenhouse gas emissions might be lower than from gasoline. The feasibility, sustainability, and environmental impacts of this option -- particularly in light of the potential impacts of global warming on agriculture -- have not yet been adequately addressed.)

ELECTRIC AND HYDROGEN VEHICLES

This bring us to electric and hydrogen vehicles. At the World Resources Institute we are in the midst of a study examining various technical, environmental, economic, and institutional issues surrounding the introduction of electric and hydrogen vehicles. This analysis is not yet complete, so the views that I present today should be considered preliminary.

The use of electric vehicles would significantly improve urban air quality. EVs emit no street-level pollutants, and if the batteries were charged at night, no new power plants would have to be built for many years, and smog (which cannot form without sunlight) would thin out dramatically.

The impact of electric vehicles on greenhouse gas emissions depends mostly on two factors: the electric efficiency of the vehicle and the emissions from the power plant that produces the

electricity used to charge it.[3] If EVs are charged by electricity from the expected mix of fossil, nuclear, and hydro plants in the year 2000, greenhouse gas emissions per mile driven for comparable vehicles would fall by 25 percent. If the electricity were produced by power plants that burn natural gas, the reduction would be 35 percent. Charging them with electricity made from coal, in contrast, could increase greenhouse gas emissions by 5 percent or even more.

Selecting the source of the electricity for charging the EVs poses a definite problem that must be taken into account in the introduction of these vehicles. The problem can be mitigated over the next decade or two by charging the vehicles with electricity from natural gas, nuclear, or hydro plants. Eventually, if global warming is to be controlled, our sources of electricity will have to change away from fossil fuels.[4] If non-fossil electricity sources -- such as wind turbines, solar electric power plants, photovoltaic cells, hydroelectric plants, and ocean-wave power plants -- were used to charge electric vehicles, pollution and greenhouse gas emissions would be nil. Regardless of which fuel is used to generate the electricity, EVs could be powered strictly from domestic sources, helping both national security and the nation's balance of trade.

A major obstacle to EV use is the difficulty of providing adequate electrical storage on board the vehicle itself. Traditionally, electric vehicles have been powered by lead-acid batteries, which are heavy and relatively short-lived. But recently improved higher-density batteries (such as the nickel-iron battery) could overcome that barrier. The new Advanced Battery Consortium should help considerably in the development of lighter, longer-lived batteries with higher energy densities. In the meantime, the problem of extended range is being addressed by introducing on-board generators to charge the batteries.

Though further down the road in their application, hydrogen vehicles offer many of the same benefits as electric vehicles. They directly emit no carbon dioxide, no carbon monoxide, no hydrocarbons, and only small amounts of nitrogen oxides. If small, light-weight, reliable fuel cells can be developed, hydrogen cars will in fact become electric vehicles. The principal obstacles to the introduction of hydrogen vehicles are

---

[3] For a recent analysis comparing the greenhouse impacts of alternative fuels, including electric vehicles, see "Reducing Greenhouse Gas Emissions With Alternative Transportation Fuels," Diane C. Fisher, Environmental Defense Fund, 1991.

[4] "Breathing Easier: Taking Action on Climate Change, Air Pollution, and Energy Insecurity," James J. MacKenzie, World Resources Institute, 1989.

a lack of a hydrogen infrastructure, the high cost of hydrogen, and the need for better on-vehicle storage technology.

THE PROMISE OF ELECTRIC VEHICLES

As this overall comparison shows, electric vehicles could reduce security and balance-of-trade risks, cut air pollution emissions, and -- if carefully charged with electricity from natural gas fired, or non-fossil, power plants -- curb carbon dioxide emissions. EVs would also provide an important link in a long-term transition to sustainable energy technologies such as solar energy and, perhaps, second-generation nuclear power. As for costs, initially they are likely to be significantly higher for EVs than for conventional sources, largely because the batteries are still expensive, and conventional vehicles are heavily subsidized through their hidden climate and security risks.

MEASURES TO ACCELERATE INTRODUCTION OF EVs

There are major economic, technical, and institutional barriers to the introduction of electric vehicles. Most of these are constructively addressed in H.R. 1538. First, the costs of these vehicles are significantly higher than those of oil powered cars and trucks. There are also problems related to their being recharged. We must ensure that not too many EVs are recharged during the day, or peak loads will be increased and new power plants will be needed. To reduce overall carbon dioxide emissions, we must try to ensure that EVs are not charged using coal-fired power plants. We have to standardize charging plugs, battery connections, and power-metering technology. We should explore time-of-use rates for recharging and the use of solar cells for charging EVs during the day in both public and private parking spaces. We must examine the entire battery cycle and adopt programs for their recycling, perhaps through a "battery deposit" or leasing programs. The pros and cons of battery-leasing programs must be analyzed to see if they could overcome the high "first-cost" problem of replacing batteries. We have to examine substitutes for our present fuel tax -- perhaps an annual vehicle tax, or an equivalent tax on electric power that is used to recharge EVs -- to cover highway maintenance costs. Consumer warranties, minimum performance specifications, and standards of quality need to be developed to avoid the debacles such as we witnessed with the early introduction of technically deficient electric heat pumps. There is also a need to supply accurate technical and economic information to consumers, both individual and corporate.

THE FEDERAL ROLE AND H.R. 1538

The federal government can play a constructive role in overcoming these barriers. In my view, one of the most effective measures the Congress could take would be to introduce (revenue neutral) carbon and security taxes on oil to reflect the climate and national security risks that oil poses. I have explored the

need for rational energy pricing in a recent WRI briefing paper published in response to the National Energy Strategy and I enclose it as part of my testimony.[5] Higher fuel prices would encourage the purchase of more efficient conventionally fueled vehicles, more fuel-efficient driving habits, and more use of public transport. They would also make electric vehicles more economically attractive.

Other financial subsidies are also likely to be needed to stimulate EV sales, but there is no guarantee that the overall costs of EVs can ever be brought down to the range of oil powered vehicles as long as the latter enjoy the subsidies represented in their pollution, climate, and security risks. As a result, absent direct federal mandates and regulation, reforming fuel prices may eventually prove necessary if we are to realize the benefits offered by electric vehicles.

Title II of H.R. 1538 proposes a commercial demonstration program for EVs. In this program the Secretary of DOE would request proposals which would involve extensive information on proposers, manufacturers, users, specific metropolitan areas, types of vehicles, life-cycle costs, the price differential between the EVs and comparable conventional vehicles, discount payments, contributions of local and state governments, and, possibly other information. The Secretary would make discount payments to the proposers to reimburse the users for the extra costs of the EVs. This process might well work but it seems to me to entail a lot of detailed paperwork and a lot of judgment, e.g. determining the price of a comparable conventionally powered vehicle. It is this latter price, subject I am sure to all kinds of varying estimates, that will determine the EV subsidy.

ALTERNATIVE SUBSIDY PROPOSAL

I would like to propose a simpler bidding scheme that I personally think could accomplish much the same goals. Under this proposal the Secretary of Energy would undertake a competitive bidding program with the manufacturers for the production and sale of EVs. Interested manufacturers of EVs would submit bids to DOE in which they would guarantee to manufacture and sell, over a give time period, a specific, minimum number of EVs for a fixed federal subsidy. The process could involve various classes of EVs, e.g. 2-passenger cars, full passenger cars, minivans, trucks, and so forth. The EVs would have to meet certain minimum safety and performance standards and have warranties. As an example, a manufacturer might offer to make and sell no less than 1000 2-seater passenger electric cars during a specific year, each with a range of at least 100 miles, for a total federal subsidy of $5 million. This would amount to

---

[5] "Toward a Sustainable Energy Future: The Critical Role of Rational Energy Pricing," World Resources Institute, May 1991.

an average subsidy of $5000 per vehicle that is guaranteed by the manufacturer to be built and sold. The Secretary of DOE would select the lowest bids for each class of comparable vehicles -- measured on a dollar/vehicle basis -- up to the total amount of funding available for that time period. It would be up to the manufacturers to find the customers for these vehicles: fleet owners, car-rental agencies, individuals, of whatever. If, during the year, the manufacturer failed to sell the guaranteed minimum number of EVs, it would be required to return to the government the "un-used" portion of the subsidy, plus some small penalty, say 10 percent of the returned amount. In the example given above, if only 800 cars were sold, then the manufacturer would return 200 x $5000 = $1 million, plus 10 percent, $1.1 million. Each year, as EV manufacturers gain experience and the number of vehicles on the road grows, one would expect successive competitive bids to require less federal subsidy per vehicle. Hence, a market "pull" is created with declining subsidies into the future. Such a program would require less paperwork all around and would eliminate the conceptually difficult task of determining what the price difference is between an EV and a comparable conventional vehicle.

OTHER FEDERAL MEASURES

Most of the following proposals appear to be included in H.R. 1538. The government should use its enormous purchasing power to begin creating markets for electric vehicles. In civilian use alone, the U.S. government has over 335,000 motor vehicles. The gradual substitution of EVs for gasoline cars and trucks in the federal fleet would begin to provide the market needed to launch the electric vehicle industry. Because of their greater environmental and security advantages and long-term benefits, I would strongly favor the purchase of EVs in the federal purchase programs over methanol, CNG, or ethanol powered vehicles.

Finally, the government can act as a catalyst to resolve many other issues, as proposed in Title III. DOE should provide funding and technical assistance for industry-government task forces to develop needed standards. DOE should undertake or support the economic, technical, and systems analysis needed to understand how electric vehicles can best be incorporated into the existing transportation infrastructure.

In summary, Mr. Chairman, I strongly support the goals and proposals of H.R. 1538. My personal suggestion would be to reconsider the structure of the subsidy program in ways that would more directly reduce vehicle costs, increase program flexibility, and cut the amount of overall paperwork.

WRI
ISSUES AND IDEAS

MAY 1991

TOWARD A SUSTAINABLE ENERGY FUTURE: THE CRITICAL ROLE OF RATIONAL ENERGY PRICING

by James J. MacKenzie

Introduction

Energy consumption poses increasing threats to the United States' economic security, political independence, and environmental health.

The war with Iraq, undertaken in part to ensure continued access to Persian Gulf oil, is a stark reminder of how closely U.S. national and economic security are linked to American dependence on imported oil. Over the coming years, as oil production in non-OPEC countries declines, more and more countries—including the United States—will be turning to OPEC, and especially to the Persian Gulf, for oil. As that happens, the influence of the major oil-producing nations of the Middle East over the economic and political destinies of oil-consuming nations will grow.

Energy use—mainly the production and burning of oil, coal, and natural gas—has other far-reaching effects besides those on U.S. national security. Even though billions of dollars have already been spent to control air pollution, emissions annually cause suffering and illness and cost billions of dollars in damages to waterways, wildlife, forest, soils, crops, materials, and structures.

James J. MacKenzie is a Senior Associate in the World Resources Institute's Program in Climate, Energy, and Pollution.

"Climate change will almost certainly be the most important factor affecting the formulation of national and global energy policy in the coming decades."

Another side-effect of growing energy use is the build-up in the atmosphere of greenhouse gases, which is inexorably leading to long-term, if not irreversible, changes in the planet's climate.[1] Climate change will almost certainly be the most important factor affecting the formulation of national and global energy policy in the coming decades. Worldwide, carbon dioxide emissions, largely the result of fossil fuel combustion, account for about half of the additional annual greenhouse warming.

Energy use is the common thread among these threats and only far-reaching energy policies can cut them down to size. Yet, President Bush's National Energy Strategy

WORLD RESOURCES INSTITUTE
1709 New York Avenue, N.W. Washington, D.C. 20006 202-638-6300

Highlights of The Bush National Energy Strategy

The National Energy Strategy (NES) was released by President Bush on February 20, 1991.* The plan's stated goals were to strike a balance among the "increasing need for energy at reasonable prices," a healthy environment, economic security, and reduced dependence on unreliable energy supplies. While the NES contains worthwhile recommendations, overall it fails to achieve the President's goals. Some of the NES's principal recommendations and expected impacts are summarized below.

Total Energy Consumption. According to the NES, total U.S. energy consumption will continue to increase for at least the next four decades. By 2010, it will have risen 37 percent to about 110 quads (quadrillion Btus) compared to 80 quads today. By 2030, energy demand will reach about 120 quads, an increase of 50 percent over today's levels, and continue to rise.

Increased Energy Efficiency. The federal government would increase its support of "integrated resource management" by utilities; assist in the development of tighter building codes; increase research and development on efficiency and solar energy in residential, commercial, and industrial applications; and strengthen efforts to improve federal energy efficiency. In transportation it would support increased federal R&D, encourage state governments to adopt programs for scrapping old cars, and encourage Americans to "drive smart." Economic incentives to encourage efficiency—such as oil-import fees or carbon taxes—are categorically rejected because of alleged potential negative impacts on inflation and economic growth.

Oil Supply. The authors of the NES optimistically expect to reverse the 20-year decline in domestic oil production and to increase it by 3.8 mmb/d by 2010. This projection is 50 percent higher than what the NES otherwise expects to occur. Ninety percent of this increase would arise from R&D on enhanced oil-recovery techniques: that is, processes to get more oil from old wells. Comparatively little of the oil would come from the Arctic National Wildlife Refuge or the outer continental shelf.

Total Oil Consumption. Under the NES, oil consumption is projected to continue rising. Demand will increase from 17 million barrels per day (mmb/d) in 1990 to 18.4 mmb/d in 2000, to 19.2 mmb/d in 2010. By 2030, NES forecasts U.S. oil use to decline somewhat, to 17.8 mmb/d. In short, even under optimistic assumptions of the NES, U.S. oil consumption will not decline below present levels.

Oil Imports. Oil imports are projected to rise from about 7.3 mmb/d in 1990 to 8.3 mmb/d by 2000. By 2010, they would decline slightly to 7.8 mmb/d only to rise dramatically to 11.6 mmb/d by 2030. In other words, under the NES, oil imports would increase 60 percent over today's levels by the year 2030.

Carbon Dioxide Releases. According to the NES, consumption of all fossil fuels will increase. By 2010, oil use will be up 12 percent over 1991; natural gas, 22 percent; and coal, 47 percent. As a result, U.S. carbon dioxide emissions will increase by 25 percent over the next two decades.

Alternative Transportation Fuels. The primary mechanism proposed to reduce oil use in vehicles is the introduction of alternative fuels: methanol, ethanol, compressed natural gas, and electricity. Biomass is proposed as a major long-term source of liquid fuels for transportation. The NES advocates unlimited CAFE benefits to manufacturers of dual-fueled vehicles. (There is now a 1.2 MPG cap on the credit that each manufacturer can take toward meeting its CAFE requirements). It also proposes federal purchases of alternatively fueled vehicles and mandatory use of alternatively fueled vehicles by fleets. The NES would extend the ethanol tax subsidy. It also advocates expanded R&D for alcohol fuels from biomass and coal.

Coal Consumption. The NES projects increases of almost 50 percent in U.S. coal consumption (from 890 million tons to 1300 million tons) by 2010, and a nearly 70 percent increase (to 1500 million tons) by the year 2030.

Renewable Energy Sources. Renewable sources of energy, mostly hydro dams and industrial wood burning, now meet about 8 percent of total U.S. energy needs. The NES emphasizes the expansion of hydro power, waste-to-electricity power plants, and liquid fuels from biofuels. It contains no major initiatives beyond research and development for electric power from photovoltaics, wind, and solar thermal. According to the NES, these latter technologies "have not yet reached a level of performance and cost that permit their diverse, widespread use."

Nuclear. The NES sees a "complete turnaround" for nuclear power. Through "regulatory reform," the development of new reactor designs, and a "vigorous" effort to move ahead with waste disposal—including legislation to overcome barriers to siting facilities—the NES sees a doubling of nuclear power by 2030 relative to present levels.

NOTES

*"National Energy Strategy," First Edition 1991/1992, Government Printing Office, Washington, D.C.

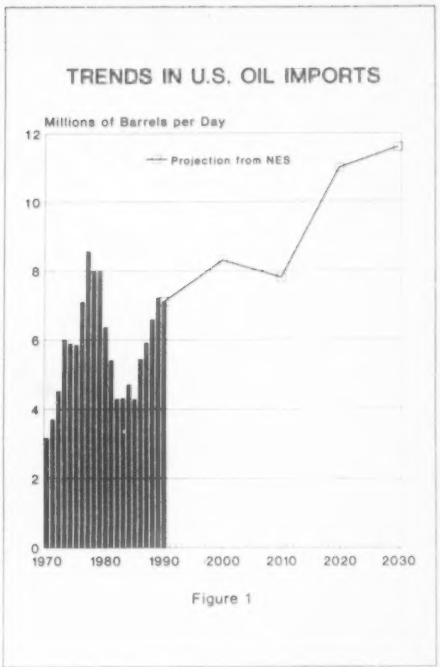


Figure 1

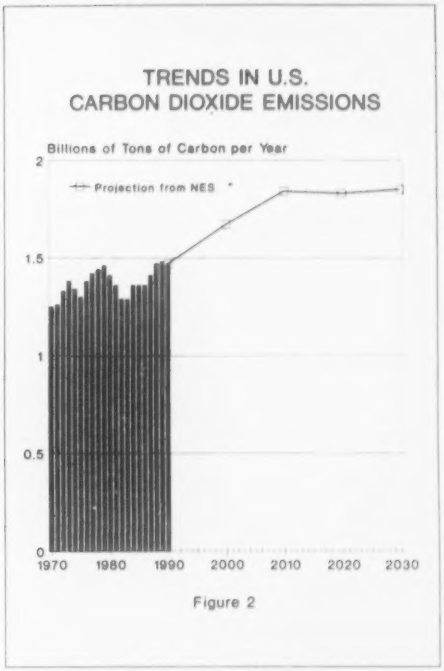


Figure 2

(NES), unveiled in February 1991 after nearly 18 months' work by the Department of Energy and other federal agencies, does little to mitigate them. (*See box.*) The plan does contain a number of useful recommendations, but as a whole the NES fails to achieve the goals enunciated for it by the President in July, 1989: a market-oriented strategy that will balance U.S. needs for reasonably priced energy, economic growth, environmental protection, and reduced dependence on insecure sources of energy.[2] In fact, despite the acknowledged need to reduce oil imports, following the NES would lead by 2030 to a 60-percent **increase** over today's levels. (*See Figure 1*). Moreover, while at least a dozen industrialized nations have committed to stabilizing or reducing their carbon dioxide emissions[3]—a very modest first step toward the 60- to 80-percent cuts ultimately needed to stabilize atmospheric concentrations[4]—the United States, under the NES, would increase its emissions by 25 percent over the next twenty years. (*See Figure 2.*) Finally, the NES fails to capture many of the opportunities to use energy more efficiently: under its provisions, total U.S. energy consumption would rise by 37 percent by the year 2010. (*See Figure 3.*)

*"Despite the acknowledged need to reduce oil imports, following the NES would lead by 2030 to a 60-percent **increase** over today's levels."*

The Failure of Energy Markets

Presidents Reagan and Bush have both taken the position that the federal government has little or no role in energy planning—that energy markets, left to themselves, will provide solutions to our energy problems.

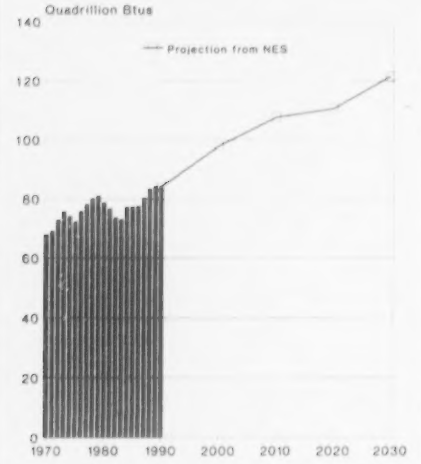


Figure 3

For sound reasons, these minimalist policies have not and cannot do the job. Most important, the assumption that energy markets—as they exist today—are working efficiently and in the national interest is untested. A review of energy patterns shows that in many sectors, for a variety of reasons, this premise does not hold and that often national energy decision-making is not in the nation's best interest.

One of the most serious shortcomings in U.S. energy markets is the failure of prices to fully incorporate the negative impacts (so-called "social costs") that energy use imposes on society—a failure that seriously distorts national energy decision-making. Fuel and electricity prices still do not reflect the billions of dollars worth of damages annually resulting from energy production and consumption, including air pollution, risks from global warming, and threats to national security. Although difficult to quantify, these costs are real. Unfortunately, the NES categorically rejects market-oriented measures, such as security or carbon taxes, that would help internalize these costs and send appropriate signals to energy consumers. This failure to consider economic measures to achieve national goals is a major flaw in the NES. Indeed, unless the nation reforms its energy pricing practices, it will be very difficult to cope with the security and environmental threats that loom in the decades ahead. The only practicable alternative to economic measures would be increased and pervasive regulation of every aspect of energy use.

Estimating the Social Costs of Energy

Several recent studies provide rough estimates of the social costs accompanying electric power production. One of these, undertaken at the Pace University School of Law in White Plains, New York, concluded that the social costs from air pollution and climate change ranged from at least one cent per kilowatt-hour (kw-hr) for natural-gas fueled power plants to as much as seven cents per kw-hr for older, polluting coal-fired plants.[4] At least in the case of the older coal plants, these costs are comparable with current retail electric power prices, which vary from five cents per kw-hr for industrial consumers to over seven cents for residential users. In short, the true costs of electricity greatly exceed the going rates.

*"One of the most serious shortcomings in U.S. energy markets is the failure of prices to fully incorporate the negative impacts (so-called **social costs**) that energy use imposes on society."*

In a similar study completed in 1988, Dr. Olav Hohmeyer of the Fraunhofer Institute for Systems and Innovative Research in West Germany estimated that the 1982 social costs of fossil fueled power plants in Germany ranged from about two cents to almost five cents per kw-hr,[5] values comparable to those calculated in the Pace study. In 1982, electricity prices in Germany

The Potential Impacts of Climate Change and Sources of U.S. Carbon Dioxide

Some of the risks from climate change include more frequent heat-related human health impacts from high temperatures; more smog as temperatures rise; higher incidence of tropical diseases from insects that move northward with the warming; erosion of barrier islands and coastal beaches as sea levels rise and tropical storms intensify; destruction of productive coastal wetlands and estuaries; saltwater intrusion into coastal groundwater; damage to coastal cities and infrastructures such as highways, powerplants, and sewage treatment plants; reduction in availability of water for irrigation, hydropower, and navigation; less cooling and drinking water from rivers; loss of natural ecosystems that cannot migrate rapidly; loss of agricultural production from extended droughts; and more frequent forest fires.

In the United States, electric utilities are the single largest source of carbon dioxide releases, producing about a third and followed closely by transportation activities at 31 percent. (*See Figure 4.*) Over the past 15 years, emissions from power plants and transportation have increased substantially while those from industry and buildings have declined. (*See Figure 5.*) With increasing electrification and more vehicles on our roads, emissions from these two sectors are expected to continue growing: reversing this trend poses a major challenge for a national energy policy.

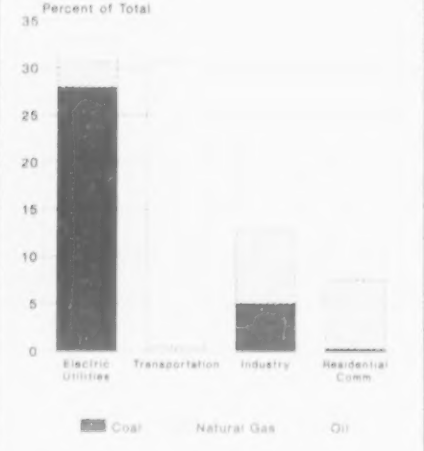


Figure 4

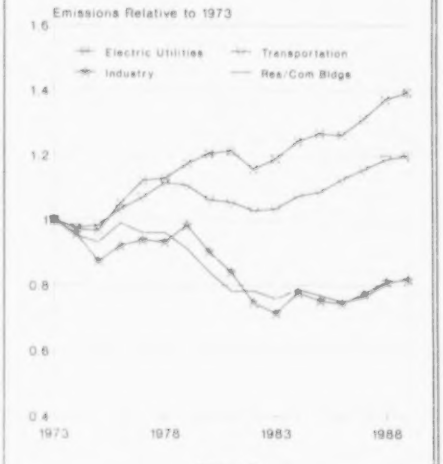


Figure 5

ranged from about five cents for industrial consumers to almost ten cents per kw-hr for residential users.

The social costs from climate change are extremely difficult to estimate. (In the Pace study, already cited, the cost of tree planting to offset carbon dioxide emissions was used as a proxy.) It is virtually impossible to assign economic values to the threat for two reasons. First, the extent and timing of the impacts themselves cannot be determined with sufficient certainty. (*See*

Box.) And, second, even where they can be, it would not always be possible to assign a dollar value to many of them, such as the loss of natural systems or even species.

In the absence of reliable estimates of the costs of these impacts, policy analysts estimate the costs of reducing the threat by, for example, imposing a carbon tax or by planting trees to reduce carbon dioxide levels. In a recent study of carbon taxes, Jorgenson and Wilcoxen estimated that a phased-in tax on fossil fuels, reaching $17 (in constant 1989 dollars) per ton of carbon in the year 2010, would hold U.S. carbon dioxide emissions constant at 1990s level.[6] This tax—refunded to consumers through reductions in other taxes—would increase the price of electricity by about 6 percent and increase oil prices by less than 4 percent. It would also reduce GNP by about 0.5 percent. In contrast, a phased-in tax reaching $60 per ton of carbon would cut emissions by 20 percent between 1990 and 2005 until they fell to 80 percent of the 1990 level and would hold them there indefinitely. Under this higher tax, electricity prices would rise by about 18 percent, the prices of oil products by about 14 percent. GNP would be reduced by about 1.6 percent from what it would otherwise be.

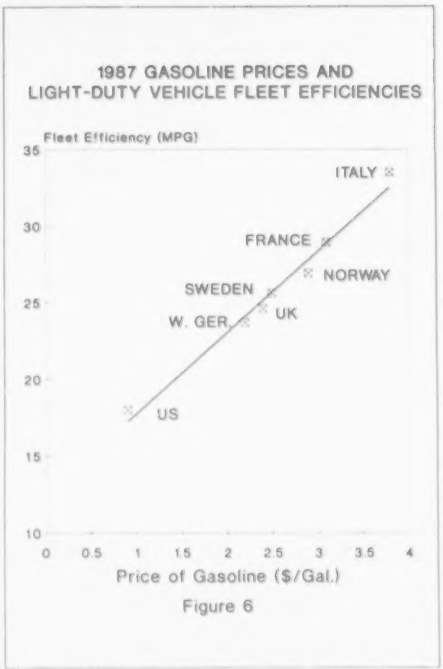


Figure 6

"Perhaps the starkest failure to include social costs in the price of energy appears in the financing of the war with Iraq."

The Social Costs Of Imported Oil

Perhaps the starkest failure to include social costs in the price of energy appears in the financing of the war with Iraq. Neither the Administration nor the Congress has proposed to pay for the country's share of the war's costs and subsequent military expenses through an oil tax. Such a tax, levied on top of a carbon tax, would begin to signal American oil consumers that their growing dependence on imported oil entails enormous costs. Instead of adopting such a market approach, the National Energy Strategy strongly rejected any security tax on oil on the grounds that it would increase inflation and reduce economic growth. With no fee on oil, American consumers will continue to regard oil as a cheap commodity rather than one safeguarded at the considerable cost of human life.

The Need For Energy Pricing Reform

Most policy proposals that address global warming and oil imports have focused on regulatory measures to improve energy efficiency; market mechanisms such as increased prices for electricity and fuels have so far elicited little interest. Examples of regulatory proposals include higher CAFE requirements for motor vehicles, minimum performance standards for major appliances, and tighter codes for new buildings. These measures will no doubt lead to more fuel-efficient vehicles, appliances, and buildings, but they will not necessarily help reduce total energy use to acceptable levels. All economically justified, these regulations basically reduce the operating

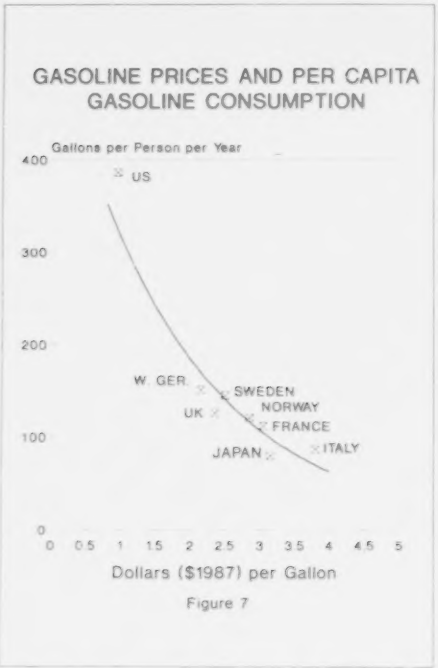


Figure 7

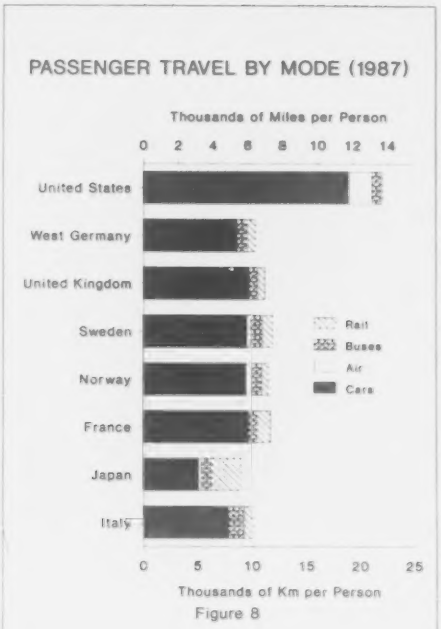


Figure 8

costs of vehicles, appliances, and buildings. But consumers spend the money saved on goods and services that require energy use, offsetting some or all of the original savings.

Consider the following example. Suppose a consumer buys a more efficient car. Initially, gasoline expenses go down, but the lower operating costs encourage more driving and less efficient driving habits, offsetting some of the initial savings. If instead the consumer spent the gas-pump savings on additional electricity, overall energy use would actually increase.[7] These illustrations are not meant to undercut the essential importance of energy efficiency improvements, but they do make it clear that—without reform in energy pricing—such improvements alone will not sufficiently reduce total fuel use. Energy-pricing reform is essential to both cut fossil fuel consumption and increase the use of renewable technologies that are comparatively easy on the environment.

The ultimate benefits of higher fuel prices are especially important to U.S. transportation's future. Gasoline prices here now hover around $1 per gallon. In Europe and Japan they range from $2 to $4 per gallon.[8] At least partly as a result of this differential, transportation patterns vary enormously. First, foreign fleets are more efficient than ours. As data collected by DOE's Lawrence Berkeley Laboratory,[9] and shown in Figure 6 make clear, higher fuel prices and higher fleet efficiencies clearly go hand in hand. In Italy, where motorists were paying almost $4 per gallon in 1987, the light-duty vehicle fleet was almost twice as efficient as that of the United States.[10]

Higher fuel prices are also associated with much lower per capita fuel use and with land use patterns less dependent on car travel. As Figure 7 shows, per capita gasoline consumption in Japan and numerous European countries is far less than half of what it is in the United

States. As Figure 8 shows, Americans travel well over twice as far by car each year as do Europeans and almost four times as far as Japanese. In Japan, automobiles are used much less than in other industrialized countries while rail is used far more. The smaller and more efficient role of automobiles in these countries is undoubtedly influenced by two interrelated factors: higher motor fuel prices and more integrated land-use and transportation planning.

The long distances that Americans travel by car are sometimes attributed to the United States' size. As Figure 9 shows, however, almost all auto trips taken by Americans are within 10 miles of home. Clearly, the urban sprawl of the past 40 years is a bigger factor in fuel use than the overall size of the country. Indeed, fully 97 percent of the miles traveled by Americans each year in their cars are in trips of 15 miles or less.[11] Vacations, averaging 114 miles each way, account for only 2 percent of the total distance Americans travel each year by car.

"Low gasoline prices in the United States fail to reflect the full social costs of driving and contribute to urban sprawl and almost total reliance on motor vehicles to meet daily needs."

Low gasoline prices in the United States fail to reflect the full social costs of driving and contribute to urban sprawl and almost total reliance on motor vehicles to meet daily needs. (On average, a U.S. car travels a total of about 28 miles per day.) The results, now all too familiar, have been high levels of urban air pollution, congestion, urban areas too patchy and wide-ranging to be well served by public transportation, the well-grounded feeling that to be without a car or truck is to be paralyzed, one of the world's least efficient motor vehicle fleets, and growing reliance on volatile sources of imported oil. To be sure, artificially low prices for motor fuel are not the only factor encouraging sprawl, near total reliance on cars and trucks, and vehicle inefficiency, but certainly they are one of the most important.

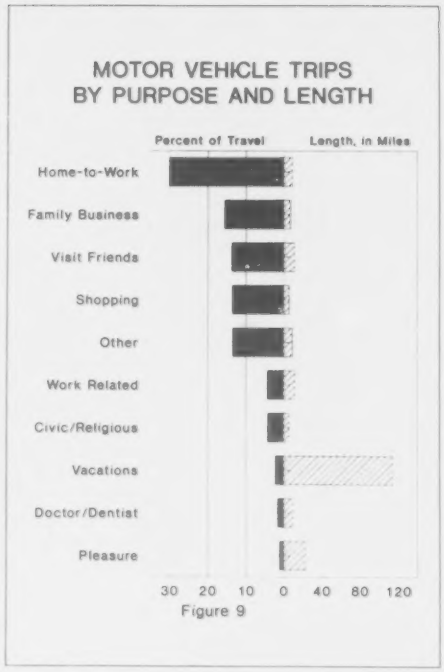


Figure 9

One argument against higher energy prices is that they hurt low-income families disproportionately. But such an inequality could easily be redressed. Some other tax on low- or middle-income families, such as the social security tax, could simply be reduced to offset the burden. For retired persons, social security benefits could be correspondingly increased. Indeed, the overall change in taxes could be progressive and still send more accurate pricing signals to consumers.

Critics of higher energy taxes have also asserted that reforming U.S. energy prices to internalize social costs would make the United States less competitive internationally. The opposite may well be true, however: today's artificially low energy prices do not encourage energy frugality. As Figure 10 shows, industrial energy prices in Japan, Germany, and indeed in the entire European OECD community, are far higher than in the United States, suggesting that higher energy prices are

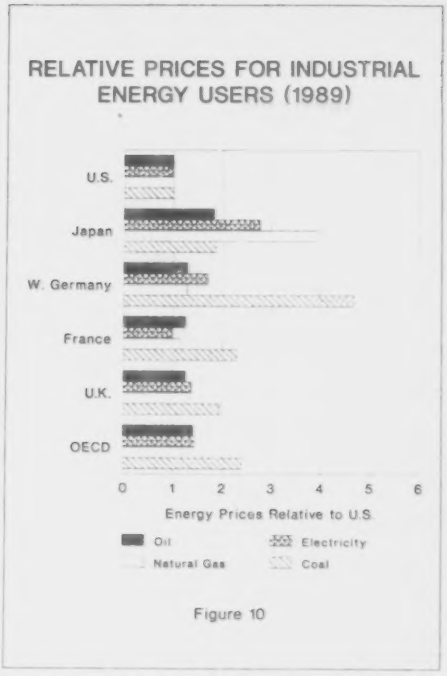


Figure 10

not at all inconsistent with the industrial leadership and innovation so characteristic of these nations.

Other Market Failures

Distorted prices aren't the only imperfections in energy markets. Residential, commercial, and industrial energy consumers often lack credible information on the technical and economic performance of investments they could make to increase their energy efficiency. Low-income families commonly live in rented apartments and lack the resources or incentive to make efficiency improvements. Aiming to keep the selling costs of new homes and office buildings as low as possible, residential and commercial developers construct buildings that do not incorporate the most economically efficient lighting, air conditioning, appliances, and electric motors simply because energy-saving equipment costs more than standard fare up front. Moreover, space in most commercial buildings is leased with the utility costs—electricity, heating, and cooling—included in the monthly rent. If tenants don't have energy meters, why should they bother to turn off unneeded lights, or upgrade the building's lighting and other energy-using equipment? In the absence of strong incentives for efficiency, the stock of commercial buildings and homes that waste energy dollars is growing and committing the United States to excessive energy use for many decades to come. Thanks to the sum total of these market imperfections, society is now under-investing in such energy bargains as more efficient refrigerators, air conditioners, furnaces, light bulbs, and other energy consuming devices.

"Society is now under-investing in such energy bargains as more efficient refrigerators, air conditioners, furnaces, light bulbs, and other energy consuming devices."

The Roles of Federal and State Governments

The federal government should have a long-term energy perspective that takes full account of both the determinants and the social costs of energy use. It should be developing a strategy that recognizes that energy influences not only national security but also our health, environment, and climate. And it should be building a consensus with Congress, state and local governments, business leaders, the energy industries, and citizens across the country on what's needed to make that vision a reality.

To encourage rational nationwide energy planning, both federal and state governments have a responsibility to help correct or compensate for market failures. Key here is making sure that electricity and fuel prices nationwide better reflect their social costs. More government funding for long-term energy research and development on both efficiency and new energy technologies is also needed. So is increased support for the adoption of the economically justified regulations needed to compensate

for market imperfections (in appliances and building design, for instance); and the design of federally assisted construction programs (in transportation and housing, for example) to make them consistent with overall national energy and environmental goals. Also important: the federal government must get its own house in order, making sure that its buildings and transportation activities are a model of efficiency for the private sector to follow.

Implementing Pricing Reform

The urgently needed pricing reforms can be realized most readily through taxes and utility rate reform imposed at both the federal and state levels. A national carbon tax on all fossil fuels to reflect their climate risks should be phased in. If it began at $10 per ton of carbon (corrected each year for inflation) and rose to $60 per ton over a decade, such a tax would encourage consumers to use fuel efficiently and to switch to non-fossil energy sources. In the first year, such a tax would raise roughly $12 billion, increasing the nation's retail energy bill by about 3 percent. By the year 2010 the tax would bring U.S. carbon dioxide emissions down by about 20 percent below present levels—providing some breathing room for longer term adjustments.

To reflect the special risks entailed in continued U.S. reliance on increasingly insecure petroleum sources, an additional security tax on oil is warranted. To cushion the economic shock, a security tax on all oil should be phased in, beginning at ten to twenty cents per gallon and rising by at least ten cents per gallon (in real terms) over at least ten years.[12] Using such a tax to double the price of gasoline would reduce consumption by 25 to 45 percent from what it otherwise would have been.[13] A major reduction in consumption would also be expected based on the European data shown in Figure 7.

Given the many other institutional barriers already mentioned, realistic energy pricing—however essential—may not by itself be sufficient to make energy markets work efficiently. Other important complementary measures are needed to boost U.S. energy productivity and accelerate the transition to non-fossil energy technologies, as the following review indicates.[14]

Transportation. Transportation figures centrally in the United States' energy and security problems. Motor vehicles, planes, and ships directly use about 63 percent of domestic and imported oil supplies and account for almost a third of U.S. carbon dioxide emissions. Cars and trucks alone account for about half of U.S. oil demand, about what the United States imports each year.

"Higher fuel prices would spur changes in travel habits, greater use of public transportation, and, ultimately, non-fossil transportation technologies such as electric or hydrogen vehicles."

Besides reforming fuel prices, government can reduce oil consumption and carbon dioxide emissions through other policies that encourage more efficient new vehicles, make vehicle use less essential, and shift transportation away from oil use. Right now, the principal measure being advocated to increase efficiency is higher CAFE (Corporate Average Fuel Efficiency) standards for cars and trucks. Analysis of the proposed CAFE standards suggests that improving new-vehicle fuel efficiency would cut predicted growth in gasoline consumption from what it would be if no further efficiency improvements were made. Yet, even with tougher CAFE standards, gasoline use is estimated to increase by almost 20 percent over today's levels by 2010 if gasoline prices stay low.[15] The problem is that higher fuel-efficiency requirements by themselves provide no incentive to change driving habits: to drive more efficiently, carpool, take the subway or bus, combine trips, or use non-fossil powered vehicles. For this reason, increased new-vehicle efficiency alone won't reduce oil imports sufficiently over the long term. Higher fuel prices, on the other hand, would spur changes in travel habits, greater use of public transportation, and, ultimately, non-fossil transportation technologies such as electric or hydrogen vehicles.

Increased new-vehicle fuel efficiency can also be pursued through programs that attach fees to gas guzzlers and rebates to gas sippers. Under this proposal, new gas-gulping vehicles would be taxed to provide a pool of money to subsidize the purchase of more efficient vehi-

cles. Such a self-financing program, inherently flexible, gives consumers an economic incentive to purchase the more efficient vehicles that might be mandated under a CAFE program.

For its part, the National Energy Strategy proposes to fatally weaken existing CAFE requirements by giving manufacturers unlimited CAFE benefits for the sale of dual-fuel vehicles, such as cars that can run on either methanol or gasoline. Under this proposal, such vehicles are assigned artificially inflated MPG ratings, far beyond what they achieve in the real world. But since there is no assurance that drivers would ever pick the alternative fuel, there is no guarantee that gasoline use would fall.

The NES advocates the widespread use of methanol, ethanol, and compressed natural gas to reduce national reliance on imported oil. Unfortunately, switching from gasoline to these fuels would not significantly reduce greenhouse gas emissions. Cars powered by methanol (made from natural gas, by far the cheapest feedstock), compressed natural gas, and ethanol (presently made from corn) have about the same, or larger, global warming impacts as gasoline- and diesel-powered vehicles.[16] (Present evidence suggests that ethanol derived from trees could lead to a reduction in greenhouse gas emissions. However, the environmental impacts of this option—soil erosion, water runoff, nutrient depletion, and so forth—need to be examined carefully.) Given these liabilities, the use of ethanol-from-corn should be discouraged while the use of methanol and compressed natural gas should be limited to urban fleets of buses and trucks where they could significantly reduce diesel smoke emissions.

Higher gasoline and diesel fuel prices would spur the development and use of more public transit and non-fossil transportation technologies, including electric and hydrogen vehicles. Cars, trucks, and buses powered by electricity would emit no smog-forming compounds or carbon monoxide and—provided they were not charged with electricity from coal-fired power plants—their use would bring carbon dioxide emissions down.

To curb oil consumption, air pollution, and congestion, long-term reforms in transportation planning are badly needed. Current needs would be best addressed when the highway act is reauthorized. Federal transportation funding should provide at least as much support, on a matching basis, for planning and building public transit and other efficient transportation options as it does for highways.

The federal government can also use its purchasing power to help expand the market for highly efficient conventional vehicles and less traditional vehicles powered by non-fossil fuels. Temporary tax incentives, such as accelerated depreciation, would give businesses an incentive to buy such vehicles. Funds for these tax incentives could be derived from fuel-tax revenues—a worthy use considering the social benefits of zero-emission vehicles.

"The federal government should provide states and local governments with the technical and financial assistance needed to adopt more energy-efficient building codes."

Buildings. Improving energy efficiency in residential and commercial buildings will be an uphill battle as long as builders have as their goal minimizing first costs (that is, construction costs) instead of life-cycle costs (those that also take operating costs into account). Under the current regime, few buildings are designed to energy standards beyond those required by building codes. Reforming electricity and fuel prices to make them more fully reflect their social impacts would help cut this problem down to size, but tighter building codes for new buildings and utility-sponsored conservation retrofits for standing structures would do more and do it faster. Recognizing as much, the great majority of electric utilities have already launched some kind of so-called demand-side management (DSM) program.[17] To complement this effort, the federal government should provide states and local governments with the technical and financial assistance needed to adopt more energy-efficient building codes and to encourage DSM programs that reward utilities that undertake aggressive conservation programs

for commercial and residential buildings and factories. A part of these codes should be the requirement that tenants in rented office and dwelling units be submetered for their energy use.

Last, the federal government should retrofit its own buildings, equipping them with the most efficient lighting, motors, heating, and ventilation systems available. It should also promote such programs among federal power-generating authorities.

Industry. U.S. industry has had a remarkable record of improving efficiency over the past two decades, primarily in response to market forces.[18] Industrial energy consumption in 1986 was a third lower than it would have been had efficiency not increased since 1972. More gains remain to be made, however, and if energy prices were reformed along the lines suggested here, industry would respond with further improvements. Besides reforming energy prices, the federal government should support cooperative research with industry to develop more efficient technologies. It should also adopt an aggressive program to ensure that industrial consumers periodically receive technical information on the availability and payback of high-efficiency equipment.

"The federal government should support cooperative research with industry to develop more efficient technologies."

Appliances. Like buildings, many major appliances are purchased by developers and building owners who have little incentive to install the more expensive but more efficient models. For this reason, in 1987 Congress passed legislation requiring minimum performance standards for major appliances. Now, the Department of Energy should strengthen these performance standards to reflect continuing technological improvements and adopt new performance standards for lighting. The Congress should also consider an "energy guzzler/energy sipper" tax for appliances similar to that for motor vehicles. The self-financing program would tax less efficient appliances and provide rebates for more efficient ones.

Switching to Non-fossil Energy Sources

After improving national energy efficiency, the widespread introduction of non-fossil energy sources should be the United States' second long-term goal. Oil, coal, and natural gas are currently used to meet about 90 percent of the country's energy needs. Gradually replacing these fuels must be a cornerstone of any program to reduce carbon dioxide emissions, curb air pollution, increase national energy security, and achieve energy sustainability.

The technological potential of renewable technologies to meet the nation's energy needs is not in doubt. At a 15-percent sunlight-to-electricity conversion efficiency, readily attainable by today's solar cells, it would take just a little more than 1 percent of the lower-48 land area to meet the country's entire energy needs. (By way of comparison, 20 percent of U.S. land is in crops and 31 percent in pastures.) Similarly, the wind-energy potential of just 12 mid-western states is enough to meet more than three times the nation's 1987 electricity demand.[19] Thus, the country's total energy needs—even including today's waste—could be met by solar cells and wind turbines alone.

Electricity-generating renewable technologies would be adopted more rapidly and widely if electric utility rate structures were reformed. One of the two vital steps needed is to adopt the price reforms on fossil fuels already described above. The other is to modify utility rates to reflect the replacement cost of power from new plants (the so-called marginal cost) rather than the average cost from older power plants. Since 70 percent of U.S. electricity is generated with fossil fuels, together these changes would provide consumers with more accurate signals as to the true worth of the power they consume and would have the effect of making renewable technologies more economically attractive.

The biggest political problems posed by these reforms would be the increased revenues to utilities and the extra financial burdens on low-income families. But neither of these pitfalls is insurmountable. Using some of the excess revenues to create subsidized "life line" rates for low-income consumers would help avoid both. The remaining extra revenues could be taxed away by the fed-

eral or state governments, making the reform of electricity rates neutral on balance. The best way to spur utility rate reform might be through federal legislation requiring state PUCs to adopt such reforms under general federal guidelines.

There are other measures the federal government could take to support the widespread use of renewable technologies. Increased shared support with industry for research, development, and demonstration is needed, particularly on systems integration and energy storage. Detailed resource assessments are needed to determine the potential for wind and photovoltaic cells to meet regional needs. Finally, the government could create a "market pull" for renewable technologies through federal purchasing policies that would offer an economic premium for the security and environmental benefits they bring.

Nuclear Fission

Nuclear power supplies about 20 percent of U.S. electricity. According to the NES, nuclear power output will double by 2030 relative to today. For a variety of reasons, this seems very unlikely to occur. Because of high construction costs, poor operating performance, and unsolved safety and waste-disposal problems, no new nuclear plants have been ordered since 1978. Nor, in the opinion of most experts, are any new plants likely to be built using current designs. Without a major successful effort to develop a new generation of safer, standardized, and more economically attractive nuclear power plants and tangible progress in radioactive waste disposal, nuclear power's role in U.S. electricity supply will begin to phase out early in the next century when today's reactors are retired.

To be a viable energy source for the 21st century, nuclear power will have to meet several conditions. Most important, the performance of the current generation of reactors will have to improve. If another serious accident occurs at a U.S. nuclear power plant, the door to future nuclear power use will almost certainly close forever. In addition, new power plant designs will be needed that are simpler, standardized, and "passive" in their safety features (that is, relying less on the functioning of "active" components such as pumps, motors, and generators.) Certainly, no further construction should take place unless these designs are complete, free of unresolved safety concerns, and certified by the Nuclear Regulatory Commission. Tighter construction standards will also be needed to ensure that only plants of the highest quality are built. Finally, progress will be needed on the storage of radioactive wastes—a key step that will almost certainly require a more cooperative, less threatening working arrangement with potential host states.

"If another serious accident occurs at a U.S. nuclear power plant, the door to future nuclear power use will almost certainly close forever."

The design, approval, construction, and testing of new power plant designs will probably take at least 15 years and might take 20. Hence, new nuclear plants are unlikely to contribute significantly to U.S. electric supply before the year 2020. In any case, the burden of improving plant operations and for developing safer second-generation designs rests with the nuclear industry.

Structure of a Sustainable Energy Economy

What would the United States economy look like if it were to evolve along the lines suggested here? First, it would be very efficient, partly as the result of efficiency codes and partly because most energy prices would be higher than today's. Its industries, transportation systems, buildings, and equipment would run largely from various energy-storage devices. Without question, energy storage will play a critical role in the post fossil-fuel era since renewable technologies—such as wind machines, photovoltaic cells, or hydro dams—are intermittent and energy is needed whether or not the winds are blowing, the sun is shining, or rains fall as predicted. Options for storing energy include batteries, compressed air, pumped-water storage, and flywheels.

One especially promising storage alternative is hydrogen. This simplest of elements can be easily made

through the electrolysis of water using electricity from renewable energy technologies. Hydrogen can be readily stored as a gas or in special compounds and can be burned in various types of engines to generate electricity or operate vehicles, including airplanes. Hydrogen burns almost without pollution, and its widespread use would complement expanded reliance on either renewable or nuclear energy technologies. Hydrogen is expensive today, but it could soon become competitive as the social costs of fossil fuels are internalized and the costs of renewable technologies continue to fall.[20]

"Renewable energy and energy efficiency together offer both the United States and the world a path to secure, clean, sustainable energy and the underpinning for long-term economic development."

In an efficient solar economy of tomorrow, U.S. homes, offices, factories, vehicles, and appliances would all consume far less energy than do their counterparts today. Accordingly, buildings would require little heating or cooling. Commercial and industrial buildings could use on-site hydrogen fuel cells—battery-like devices that consume hydrogen and produce electricity and heat—to efficiently provide electric power, hot water, and space heat. Generated mostly in the Southwest using photovoltaic cells and in the Midwest using wind turbines, the hydrogen would be transported and distributed through pipelines much like those now used by the natural gas industry. Residential homes would have solar water heaters and space heating and cooling systems using hydrogen or electric heat pumps. The utilities of tomorrow would operate the large wind farms, solar arrays, and solar thermal power plants to provide electricity for direct use and for the manufacture of hydrogen. Vehicles would be powered mostly by electricity using batteries or hydrogen using fuel cells. Airplanes would run on hydrogen or liquids made from biofuels, such as methanol or ethanol.

An economy running on renewable energy sources would be almost free of air pollution and carbon dioxide emissions. The most promising renewable technologies for producing electric power—wind and photovoltaic cells—involve no combustion whatever. And since hydrogen combustion mainly produces water, there would be no emissions of hydrocarbons or carbon monoxide and few if any nitrogen oxides. As a result, there would be no smog.

A U.S. economy structured along the lines proposed here would have a sustainable energy supply: as long as the sun shines, electricity and hydrogen would be available to power its homes, buildings, factories, and vehicles. Such an energy economy would also be self-sufficient—obviating any need to import fuels from abroad. This would also be applicable and replicable in other parts of the world. The technologies are relatively straightforward to manufacture and are decentralized in their application. In short, renewable energy and energy efficiency together offer both the United States and the world a path to secure, clean, sustainable energy and the underpinning for long-term economic development.

Notes

1. Intergovernmental Panel on Climate Change. 1990. "Climate Change, The IPCC Scientific Assessment." Cambridge University Press. New York.

2. "National Energy Strategy, First Edition, 1991/1992," U.S. Government Printing Office, Washington, D.C. 20402, p. B-3.

3. Including, as of January 1991, Austria, Australia, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden, and the United Kingdom. "Changing by Degrees, Steps to Reduce Greenhouse Gases," Office of Technology Assessment, U.S. Congress, February 1991.

4. "Environmental Costs of Electricity," Pace University Center for Environmental Legal Studies, 1990.

5. "Social Costs of Energy Consumption," Olav Hohmeyer, Springer-Verlag, New York, 1988.

6. "Reducing U.S. Carbon Dioxide Emissions: the Cost of Different Goals," Dale W. Jorgenson and Peter

J. Wilcoxen, in *Energy Growth and the Environment*, ed. by John Moroney, forthcoming, 1991.

7. A dollar of reduced gasoline use would save about a gallon of fuel with an energy content of 125,000 Btu. If spent on electricity purchases, the dollar would buy about 14 kw-hrs, requiring the burning of about 140,000 Btus of fuel at the power plant.

8. International Energy Agency, OECD, "Energy Prices and Taxes, Second Quarter 1990."

9. "Energy Use in Passenger Transport in OECD Countries: Changes between 1970 and 1987," Lee Schipper et al., LBL-29830, January, 1991. Gasoline prices from "1988 Energy Statistics Sourcebook," PennWell Books, page 320.

10. Interestingly, none of these countries have CAFE-like fuel efficiency regulations.

11. Motor Vehicle Manufacturers Association of the United States, "Facts and Figures, 1990" p. 49.

12. The tax should be on both domestic and imported oil since saving a barrel of either would lead to reduced imports.

13. "Reducing Oil Consumption in Cars and Light Trucks," testimony of David E. Gushee, Congressional Research Service, before the Subcommittee on Energy and Power, Committee on Energy and Commerce, U.S. House of Representatives, March 13, 1991.

14. For a more detailed discussion of sector-by-sector policy options see "Changing by Degrees: Steps to Reduce Greenhouse Gases," Office of Technology Assessment, U.S. Congress, February 1991.

15. "Savings from CAFE, Projections of the Future Oil Savings from Light Vehicle Fuel Economy Legislation," American Council for an Energy-Efficient Economy, Washington, D.C., Draft, Feb. 12, 1991.

16. "Reducing Greenhouse Gas Emissions With Alternative Transportation Fuels," Diane C. Fisher, Environmental Defense Fund, 1991.

17. Eric Hirst, "Demand-Side Management," *Environment*, January/February 1990.

18. "Energy Conservation Trends: Understanding the Factors That Affect Conservation Gains in the U.S. Economy," U.S. Department of Energy, DOE/PE-0092, September 1989.

19. "U.S. Areal Wind Resource Estimates Considering Environmental and Land-Use Exclusions," D.L. Elliott, et al., Pacific Northwest Laboratory, Sept. 28, 1990.

20. "Solar Hydrogen, Moving Beyond Fossil Fuels," Joan M. Ogden and Robert H. Williams, World Resources Institute, October 1989.

ABOUT WRI

World Resources Institute (WRI) is an independent research and policy institute founded in 1982 to help governments, environmental and development organizations, and private business address a fundamental question: How can societies meet basic human needs and nurture economic growth without undermining the natural resource base and environmental integrity?

WRI's work is carried out by a 95-member interdisciplinary staff, strong in the sciences and economics and augmented by a network of advisors, collaborators, international fellows, and cooperating institutions in more than 50 countries. WRI currently focuses on six broad areas—climate, energy and pollution; forests and biodiversity; economics; technology; resource and environmental information; and institutions—and augments policy recommendations with field services and technical support for groups working in natural resource management.

WRI is a private, not-for-profit corporation that receives financial support from foundations, governmental and intergovernmental institutions, private corporations, and concerned individuals.

Printed on Recycled Paper

Mr. SCHEUER. Thank you very much.

Let me ask each of you: of all of the alternatively- fueled vehicles which you have heard about—compressed natural gas, electric vehicles—which do you score the highest in terms of its overall environment impact?

Mr. MACKENZIE. I would put electric and hydrogen at the top. Hydrogen is not quite as close as electric vehicles are, but overall in terms of air quality and in terms of the potential for low emissions at the powerplant, I would put electric vehicles at the top.

Mr. KRUPNICK. I would agree entirely with that. We did a study at Resources for the Future that looked particularly at the cost effectiveness of methanol vehicles versus gasoline vehicles and find that methanol is an extremely expensive alternative, going through a lot of rigmarole just to get small reductions in ozone-causing emissions.

So we certainly would like to see more attention put on electric vehicles—the way your bill does.

Mr. SCHEUER. In a more perfect world, let us say, what kind of vehicles should we all be driving by the year 2000?

Mr. KRUPNICK. There's not one best vehicle. Let me take this opportunity to mention or sort of go against the current of some of the discussions I have heard today. It is not clear at all to me that electric vehicles are the answer for every area of the country. If one is concerned about air quality—now, energy security is a national-level concern, not city-by-city—but if it is air quality, Milwaukee, who may be just slightly out of compliance with the air quality standards, they don't need to go the electric vehicle route or methanol vehicle route. Maybe they can do that with reformulated gasoline.

So I don't think there is one best vehicle for every area. If I have to rank them the way you asked me before, I'd put electric vehicles up there. But there is not one best.

Mr. MACKENZIE. Mr. Chairman, I think that the overriding environmental threat is global warming. Over the past 15 years our fleet has improved. Carbon dioxide emissions per vehicle have gone down 20 percent, but total emissions from vehicles have gone up 40 percent because of growth in the number of vehicles and the travel.

The only way we are going to deal with that problem is to get off of fossil fuels in cars, period. In my view this— eventually hydrogen with fuel cells making it an electric vehicle is the only technological option that I can see that is going to get us there.

How fast we get there is really a function of how hard we push on the system. I think what you are proposing here is a very effective way to get us moving to internalize those risks and to get us to where we ought to be.

Mr. SCHEUER. Let me ask you a question about process. Let's assume that the electric vehicles are the desiderata for the year 2000 or whatever. How do we get from here to there? I'm a little puzzled by this 100 vehicles. It seems to me that if we are going to have a demonstration program it ought to be a real demonstration program and it ought to be more than 100 vehicles. Maybe it should be 1,000 vehicles or 10,000 vehicles.

From the point of view of balancing time with cost, balancing time in as a cost and not wanting to waste money, wanting to get

the biggest bang for a buck from any government funds that are used to subsidize this or support it, something that a market would support an enormous number of these cars annually if we could match the car to the market, what do you see as the best way to use scarce government funds and cut down the time that it would take to get this electric vehicle massively accepted by the market, both at home and around the world?

Mr. MACKENZIE. Well, Mr Chairman, I think that the factor that is going to force electric vehicles most quickly is the California Air Resources Board set of regulations. That's going to get, as you know, 400,000 vehicles on the road by the turn of the century. Massachusetts and New York are also going to do it.

But there is a certain time that you need for gestation, for getting the plugs, to getting the batteries. You don't want cars that don't run. You don't want to prove that it can't be done. That concerns me. We introduced heat pumps too rapidly. They were not up to consumer performance and it was a disaster. My worst nightmare is they are going to produce electric vehicles equivalent to the Yugos that sort of fall apart and people will say we proved it couldn't be done.

So it is important to go as rapidly as we can, but with as much care as we can, as well.

Mr. KRUPNICK. I would say that the spending on the R&D for the battery is the most important component. We have heard it today over and over again. That's what the Federal Government should be spending money on.

And I think we ought to be moving, as you said, Mr. Chairman, towards environmental costing, the incorporation of social costs of energy into prices; that these energy taxes would raise money and not spend it. It could be allocated to mass transit, and so on. This is the way to—those two things together I think would be the dawn of the long-awaited age of electric vehicles.

Mr. SCHEUER. Let me bounce off of you two chaps a proposal that I made to encourage people to make more rational and cost-effective decisions when buying a car.

I set up sort of a stick and a carrot. In each category of automobiles—large ones, medium-sized ones, small ones— we look at those cars and distinguish between energy sippers and energy guzzlers—gas guzzlers and gas sippers—and we say within each category these are the gas guzzlers, these are the gas sippers, we're going to give you a little premium if you buy a gas sipper and we're going to sock you with a little fee if you buy a gas guzzler. Within each category they would be revenue neutral. It would sort of artificially create some market incentives in each category of car to buy the car that was fuel efficient. How does that idea grab you?

Mr. MACKENZIE. It's great. It is absolutely essential. I personally prefer it to the CAFE because it provides consumers incentives to buy more efficient vehicles.

Let me just say, though, that without higher fuel prices it doesn't affect how you drive those vehicles. Driving a car at 65 rather than 55 can be a 15 to 25 percent fuel penalty in efficiency. It gives you no incentives to combine trips, to use HOV lanes, to do all the other things. It's energy use, not just fuel efficiency, that is our

goal. But I think that's an excellent means of encouraging the purchase of more efficient vehicles.

Mr. SCHEUER. We'll send you both copies of those bills and maybe you can drop us a line.

Let me ask one question. How do each of you evaluate DOE's efforts over the last let's say decade in the development of alternatively-fueled vehicles? I know that you'll be scrupulously fair and carefully objective in your characterization of DOE's efforts.

Mr. KRUPNICK. I have a parry for that one—

Mr. SCHEUER. For example, I am famous for my ruthless objectivity in judging the talents and merits of my grandchildren. I want you to apply that same ruthless objectivity in describing the efforts of DOE over the last decade to promoting alternatively-fueled vehicles for the internal combustion machine and machines that lock us further into the continued dependency on Persian Gulf and other foreign sources of fossil fuels.

Mr. KRUPNICK. I judge my children on what they do today, not in what they did four years ago or ten years ago. I only have a five-year-old.

So let me just say that what DOE is doing now as part of the national energy strategy is something that RFF is involved in—my organization—which is a million dollar study with Oak Ridge National Lab to estimate the environmental, energy security, and other social costs of energy. This is with respect to electric utilities and those fuel cycles, but it would include transportation, as well. And your own State, New York State, is engaging in—just beginning now in the same level of effort for a study for New York utilities. This research will directly feed into the effort that we have been talking about here to value the environmental and energy security benefits of reducing energy use. I think DOE is to be applauded for going ahead in this effort, so I mark them highly today.

Mr. SCHEUER. Well, let me make clear that I think that the Secretary of DOE, Admiral Jim Watson, is one of the stars of this Administration. And I think we all owe him a debt of gratitude for having put together what was not perhaps a perfect national energy program but a damn good national energy program in considering all of the environment problems — and I mean political environment problems—that beset him. It was a damn good program. I'd give him a B+/A-. He's a first-class guy and a tremendous public servant.

I think it is a tragedy that President Bush had the acumen to pick such a talented guy in the first place and then permit the OMB types—Mr. Sununu and Mr. Darman—to absolutely trash that program unmercifully. I would say the same thing as a generality about Mr Bill Reilly at the EPA. He has a tremendous zest, enormous talent, vast background, and it is just pitiful of how little of his recommendations and thinking end up alive and well after the scrutiny they get from Mr. Darman and Mr. Sununu.

Does anybody—yes?

Mr. MACKENZIE. Mr. Chairman, you know, just as there is a vacuum at the Federal level being filled by the States, there is a vacuum in the Administration that is being filled by the Congress, and I think that what makes this place work, is the fact that when

they fail, that people like you and George Brown pick up the ball and move us forward. And I think that's really to be commended, and your leadership is very, very much appreciated.

Mr. SCHEUER. On that high note, let us end this hearing.

We appreciate your tolerance and patience. It is now 1:15. The hearing is suspended at the call of the chair.

[Whereupon, at 1:12 p.m., the subcommittee adjourned, to reconvene at the call of the Chair.]

MARKUP OF H.R. 1538—THE NATIONAL ELECTRIC VEHICLE ACT OF 1991

TUESDAY, JUNE 25, 1991

U.S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
SUBCOMMITTEE ON ENVIRONMENT,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10:10 a.m. in room 2318, Rayburn House Office Building, Hon. James H. Scheuer [chairman of the subcommittee] presiding.

Mr. SCHEUER. Good morning.

Today the Subcommittee on Environment will consider H.R. 1538, the National Electric Vehicle Act of 1991, introduced by our colleague and Chairman of the Science, Space, and Technology Committee, the Honorable George Brown of California.

The National Electric Vehicle Act addresses two of the most difficult challenges faced by our Nation: energy conservation and air pollution. The transportation sector of our economy accounts for more than 60 percent of all of the petroleum consumed in the United States, and more than 70 percent of that petroleum is consumed by passenger cars and trucks. Any serious effort toward increased conservation must include motor vehicles.

This bill also addresses our need for greater energy conservation in the transportation sector. Motor vehicles also account for almost 25 percent of all carbon dioxide emissions from fossil fuels, 400 million tons per year, 400 million tons per year. So it follows, as night follows day, that any major reductions in air pollution also must include the transportation sector of our economy, and this bill addresses that critical problem.

It seems to me to be one of the great ironies of all time that we are willing to spend billions and billions of dollars and risk thousands of young American lives to protect our access to energy in the Persian Gulf, namely fossil fuel energy, while at the same time we have been unwilling to spend even an infinitesimal fraction of that amount at home here to preserve our access to energy—in other words, to find alternatives to imported oil, energy conservation, energy efficiency, and above all, alternative sources to fuel. And really, that is what the electric car is all about.

I would like to recognize Congressman Don Ritter of Pennsylvania, our distinguished ranking minority member.

Mr. RITTER. Thanks, Mr. Chairman. Thank you for your leadership on this bill. I would also wish to commend Mr. Brown for his

hard work and his efforts for many years in developing this legislation.

Increased use of electric vehicles can reduce our dependence on imported oil and yield benefits to the environment. By one estimate, electric vehicles have 97 percent fewer emissions than conventional vehicles.

It is no surprise that Chairman Brown is a strong proponent of this legislation. He realizes full well that in the Los Angeles Basin the real answer to smog and air pollution is the electric vehicle. And, to the extent that he and others of us can make this happen earlier in America, I think we are making a big dent on air pollution, especially in those difficult parts of the country where you have photochemical inversion and massive amounts of cars.

The greatest hurdle to market acceptance of electric vehicles is the fact that the technology—particularly, the batteries—isn't sophisticated enough at the present to compete favorably with conventional vehicles. There has been a substantial amount of progress, however. This past April a modified Honda auto, powered by zinc air batteries, won an Electric 200 race in Arizona, showing impressive performance.

This legislation, with its emphasis on technology development and demonstration, is well placed. Advanced electric vehicle technologies are on the horizon through unprecedented cooperative agreements among auto manufacturers, the Federal Government, and electric utilities. Similar efforts are under way in Europe and Japan.

Title I of the bill will spur the development of appropriate electric vehicle technology. The provisions of Title III of the bill, relating to infrastructure for electric vehicles, is as important as demonstration projects and technology development.

The Chairman and I were talking just a moment ago about the export potential. If we are number one or highly competitive in this new field, we can export these new cars to the Londons and the Parises and the Hamburgs, cities that face severe air pollution problems due to automobile emissions.

The provisions of Title III of the bill relating to infrastructure for electric vehicles are also quite important. They are as important as the demonstration projects and the technology development.

Mr. Chairman, I have a modest amendment to the bill and some proposed report language, which I will describe when the bill is open for discussion.

On the whole, I believe the bill is a good one, and at this point, I yield back the balance of my time.

Mr. SCHEUER. Congressman George Brown?

The CHAIRMAN. Thank you very much, Mr. Chairman. Let me say that I am personally grateful to you for bringing the legislation to the stage of markup which we are at today, and I have high hopes that it will move smoothly through the full committee when it gets to that point.

Let me say that this bill represents a very important point in my own political career. I recall quite clearly that when I first ran for public office in California, I promised to solve the smog problem. That was in 1954. This may be the closest that we'll ever get to actually accomplishing that goal, and I am looking forward to it.

Actually, the bill is a bill whose time has come. We wrestled with electric vehicles back in the 1970s, and I had the privilege of authoring legislation at that time that set up a small electric vehicle demonstration program, research and development and demonstration, and in my opinion the program succeeded in achieving its goals but the rapidly declining price of oil after that initial shock tended to take the priority away from alternatives to petroleum, including the electric vehicle, and the program has waned since then.

Today we see a situation in which all of the interested parties have reached agreement on the need to move forward here, and that includes the automobile industry, which is already proposing to start manufacturing electric vehicles; the electric utility industry, which is pushing vigorously for the enactment of this kind of legislation; the environmental regulatory agencies; local governments—these groups are all offering to put substantial funds of their own into this program, and they are eager to meet the deadlines which have already been set; for example, in California, to have a certain percentage of nonpolluting vehicles on the highway within the next five or six years. That will be, in my opinion, very difficult to accomplish unless we move forward very quickly with electric vehicle legislation.

So I am very pleased to see these developments. I am delighted with the recognition which we in this committee and you, Mr. Chairman and Mr. Ritter, have given to this legislation, and I am looking forward to seeing it move expeditiously.

I would just say that probably as with all legislation, this is not yet a perfect bill. I'm not sure what a perfect bill is, as a matter of fact. I anticipate that we will make further improvements in it as we go forward during the various stages. When the final product is passed, I am sure that it will be a major contribution to the energy future and the environmental future of this country, and I am looking forward to that date.

Thank you, Mr. Chairman.

Mr. SCHEUER. Thank you, Mr. Chairman.

Mr. Morrison of the State of Washington?

Mr. MORRISON. Thank you, Mr. Chairman. I am pleased to be here for the markup this morning.

My predecessor, as our Chairman George Brown will remember, Mike McCormick, was big in this area, and it was in his subcommittee that I think Mr. Brown did some of his earlier work. And as we have realigned responsibilities, Mr. Chairman, the battery development aspects of this bill are now under the umbrella of this subcommittee, that used to be with the Energy Subcommittee, and we are delighted.

Really, the electric car, as far as I am concerned, represents a transfer of energy sources from petroleum to the mix of sources that we use for electrical generation. You could almost, if you wanted to stretch just a little ways, dub this the "nuclear car." So our agenda from the Energy Subcommittee, of course, is to provide as many alternative energy sources to fuel this marvelous new vehicle, and we will be enthusiastically with you all the way.

Thank you, Mr. Chairman.

Mr. SCHEUER. Ms. Horn from the State of Missouri?

Ms. HORN. Thank you, Mr. Chairman. I salute all who have brought us this far on this bill and look forward to it becoming an even better bill.

My only comment is that I see this as a wonderful model and way of the future in terms of the cooperation amongst the giants of the car industry, other private interests. and Government interests, and I think this is what we must look to more and more as we take these technologies out of the realm of possibility and develop them and get them into the marketplace. I see this as a wonderful model and example of how that can best be done, a cooperative effort among industry and the private sector and the public sector. I look forward to moving this bill on.

Thank you.

Mr. SCHEUER. Thank you, Ms. Horn.

Now, Congressman Tom McMillen?

Mr. MCMILLEN. Thank you, Mr. Chairman. I, too, would like to commend Chairman Brown for his leadership and you for your leadership on this issue. If we want to have an energy policy in this country, it has to deal with automobiles, which consume two-thirds of our oil in America. Clearly, electric vehicles are an option. This legislation will enable us to go down that road, and I look forward to its passage.

Mr. SCHEUER. I thank the gentleman.

And now I will call up H.R. 1538, the National Electric Vehicle Act of 1991, for our immediate consideration.

The Clerk will read the bill.

Ms. FAUNCE. "H.R. 1538, To establish a national electric vehicle research, demonstration, and commercialization program for the United States, and for other purposes."

Mr. SCHEUER. I ask unanimous consent that the bill be considered as read and open for discussion.

[No response.]

Mr. SCHEUER. There being no objection, it is so ordered.

H.R. 1538 establishes a national electric vehicle research, demonstration, and commercialization program. The bill establishes an accelerated research program in cooperation with industry to develop advanced batteries for electric vehicles.

The cost of this R&D program is being shared 50 percent by the Federal Government and 50 percent by the private sector.

The b. l amends the Alternative Motor Fuels Act of 1988 to allow electric vehicles to be eligible for inclusion in the Clean Fuel Government Fleet. The bill authorizes an electric vehicle demonstration program for the purpose of gathering operational experience to accelerate commercialization of EVs, electric vehicles. The bill addresses electric vehicle infrastructure needs through the establishment of cooperative programs to identify EV infrastructure requirements.

H.R. 1538 has the support of the automotive industry, the electric utilities, and environmentalists. In dramatic contrast to bills introduced in previous years, H.R. 1538 has at least the qualified support of the Department of Energy.

[A copy of H.R. 1538 follows:]

I

102D CONGRESS
1ST SESSION

H. R. 1538

To establish a national electric vehicle research, demonstration, and commercialization program for the United States, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

MARCH 20, 1991

Mr. BROWN (for himself, Mr. LEWIS of California, Mr. MOORHEAD, Mr. PACKARD, Mr. WISE, Mr. ANDERSON, Mr. BRUCE, Mr. YATES, Mr. SCHEUER, Mr. DELLUMS, Mrs. UNSOELD, Mr. BERMAN, Mr. HENRY, Mr. WOLPE, Mr. LANTOS, Mr. TORRICELLI, Mr. MCMILLEN of Maryland, Mr. ZIMMER, Mr. BOEHLERT, Mr. SWETT, Mr. TORRES, Mr. FAZIO, Mr. WEISS, Mr. KOPETSKI, Mr. VALENTINE, Mr. SHARP, Mr. CAMPBELL of California, Mr. LAGOMARSINO, Mr. MARTINEZ, Mr. LOWERY of California, Mr. SANDERS, Mr. LEVINE of California, Mr. BOUCHER, Mr. ALEXANDER, Mrs. LLOYD, Mr. MATSUI, Mr. WAXMAN, and Mr. GALLEGLY) introduced the following bill; which was referred jointly to the Committees on Science, Space, and Technology and Energy and Commerce

---

A BILL

To establish a national electric vehicle research, demonstration, and commercialization program for the United States, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Electric Vehicle Act of 1991".

SEC. 2. FINDINGS.

The Congress finds that—

(1) the interstate commerce of the United States depends on motor vehicle transportation, and the accelerated commercialization of electric vehicle technology is desirable to enable American businesses and consumers to actively engage in interstate commerce in a way that effectively achieves environmental, energy, and economic goals;

(2) nearly one-half of the oil consumed in the United States is imported, and of that amount more than one-quarter is imported from the Middle East, where two-thirds of the world's proven oil reserves are located;

(3) the transportation sector accounts for nearly two-thirds of total oil consumed in the United States, and of this amount passenger cars and trucks represent more than 70 percent of the oil used;

(4) the fuel economy of the new car fleet has more than doubled since 1974, yet total United States petroleum consumption in 1989 was approximately the same as in 1974, due primarily to increases in the number of vehicles and the number of vehicle miles traveled each year;

(5) if the United States is to remain competitive in foreign commerce, then the United States transportation sector must become less dependent upon foreign sources of petroleum and more reliant on clean alternative fuels, including electricity, in vehicles;

(6) cost-effective steps to reduce emissions that cause smog and carbon monoxide will help improve environmental quality without also causing damage to commerce and the economy;

(7) beginning in model year 1998, Federal law requires the introduction of clean alternative fuel vehicles (which could include electric vehicles) into vehicle fleets in areas across the United States that fail to meet air quality standards; and

(8) a number of companies doing business in United States interstate and foreign commerce have demonstrated prototype electric vehicles and have indicated a commitment to produce electric vehicles, but Government action is needed to facilitate market forces that will result in wider use of electric vehicles in and affecting United States interstate and foreign commerce.

SEC. 3. DEFINITIONS.

For the purposes of this Act—

(1) the term "associated equipment" means equipment necessary for the regeneration, refueling, or recharging of batteries or other forms of electrical energy used to power an electric vehicle;

(2) the term "comparable conventionally-fueled vehicle" means a vehicle powered by an internal combustion engine that utilizes gasoline or diesel fuel as its fuel source and provides passenger capacity or payload capacity the same or similar to an electric vehicle, as determined by the Secretary;

(3) the term "electric vehicle" means a vehicle primarily powered by an electric motor that draws current from rechargeable storage batteries, fuel cells, or other sources of electrical current, and that may include a nonelectrical source of supplemental power;

(4) the term "other clean alternative fuel vehicle" means a vehicle capable of being fueled by a clean alternative fuel, including methanol, ethanol, or other alcohol (including any mixture thereof containing 85 percent or more by volume of such alcohol with gasoline or other fuels), natural gas, liquefied petroleum gas, and hydrogen;

(5) the term "Secretary" means the Secretary of Energy;

(6) the term "State" means each of the several States, the District of Columbia, the Commonwealth of Puerto Rico, the United States Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and any other Commonwealth, territory, or possession of the United States; and

(7) the term "user" means a person or entity that purchases or leases an electric vehicle.

SEC. 4. AUTHORITY TO OBLIGATE FUNDS.

The authority of the Secretary to obligate funds pursuant to this Act shall be effective for any fiscal year only to such extent and in such amounts as are provided in advance by appropriation Acts.

TITLE I—ELECTRIC VEHICLE AND BATTERY RESEARCH AND DEVELOPMENT PROGRAM

SEC. 101. DEFINITION.

For purposes of this title, the term "advanced battery technology" means electro-chemical storage devices, including fuel cells, and associated technology necessary to charge, discharge, recharge, or regenerate such devices, for use as a source of power for an electric vehicle, and any other associated equipment.

SEC. 102. COOPERATIVE PROGRAM.

(a) The Secretary, consistent with the comprehensive plan described in subsection (b) of this section, shall establish a cooperative program with the electric utility industry, the automobile industry, and such other persons or industries as the Secretary considers appropriate to conduct joint cooperative research and development projects with industry in areas of technology development such as—

(1) high efficiency electric power trains, including advanced motors, motor controllers, and hybrid power trains for vehicle range improvement;

(2) light-weight body structures for vehicle weight reduction;

(3) advanced battery technology with high energy and power for electric vehicle application;

(4) primary batteries and fuel cells for hybrid vehicle application; and

(5) photovoltaics for application with electric vehicle use.

The Secretary may also include any such projects that were entered into under the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5901–5920) or the Electric and Hybrid Vehicle Research, Development, and Demonstration Act of 1976 (15 U.S.C. 2501–2514) in the program under this section.

(b)(1) The Secretary shall prepare a comprehensive multi-year program plan for carrying out this title. In the preparation of such plan, the Secretary shall consult with the Administrator of the Environmental Protection Agency, the Secretary of Transportation, the heads of other appropriate Federal agencies, representatives of the electric utility industry, electric vehicle manufacturers and the United States automobile industry, and such other public and private organizations as the Secretary considers appropriate.

(2) The comprehensive plan shall include—

(A) a prioritization of research areas critical to the commercialization of electric vehicles, including advanced battery technology;

(B) the program elements, management structure, and activities, including program responsibilities of Federal agencies and departments;

(C) the program strategies, including technical milestones to be achieved toward specific goals during each fiscal year, for all major activities and projects;

(D) the estimated costs of individual program elements, including estimated costs for each of the fiscal years of the plan for each of the participating Federal agencies or departments;

(E) a description of the methods of technology transfer;

(F) the proposed participation by non-Federal entities in the implementation of the plan; and

(G) such other information as the Secretary considers appropriate.

(3) Not later than 90 days after the date of enactment of this Act, the Secretary shall transmit the comprehensive plan to the Congress. Such plan shall be revised and such revision transmitted to the Congress when significant changes are proposed.

(c) Not later than 180 days after the date of enactment of this Act, the Secretary shall request proposals or seek to negotiate joint cooperative research and development projects under this section.

(d) The contribution of the United States to any project under this title shall not exceed 50 percent.

(e) The Secretary shall conduct evaluations, arrange for tests and demonstrations, and disseminate to non-Federal entities information, data, and materials necessary to support efforts undertaken pursuant to this section.

SEC. 103. TECHNOLOGY TRANSFER PROGRAM.

(a) The Secretary shall conduct a program designed to accelerate wider application of advanced electric vehicle technology, including advanced battery technologies.

(b) The Secretary, in carrying out the program authorized by subsection (a), shall—

(1) undertake an inventory and assessment of advanced electric vehicle technologies and their commercial capability; and

(2) develop a Federal-industry information exchange program to improve technology transfer, which may consist of workshops, publications, conferences, and a data base for use by the public and private sectors.

SEC. 104. CONSULTATION.

The Secretary shall consult with the Administrator of the Environmental Protection Agency and the Secretary of Transportation in carrying out this title.

SEC. 105. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to the Secretary to carry out this title $50,000,000 for fiscal year 1992, $68,000,000 for fiscal year 1993, $91,000,000 for fiscal year 1994, and $100,000,000 for each of the fiscal years 1995 through 1998.

TITLE II—ELECTRIC VEHICLE COMMERCIAL DEMONSTRATION PROGRAM

Subtitle A—Electric Vehicle Cost-Share Commercial Demonstrations

SEC. 201. DEFINITIONS.

For purposes of this subtitle—

(1) the term "eligible metropolitan area" means—

(A) any ozone nonattainment area classified under subpart 2 of part D of title I of the Clean Air Act as Serious, Severe, or Extreme;

(B) any carbon monoxide nonattainment area with a carbon monoxide design value at or above 16.0 parts per million, but does not include carbon monoxide nonattainment areas in which mobile sources do not contribute significantly to carbon monoxide exceedances; or

(C) any metropolitan statistical area with a 1990 population of 200,000 or more; and

(2) the term "price differential" means—

(A) in the case of a purchased vehicle, the difference between the manufacturer's suggested retail price of such vehicle and the man-

ufacturer's suggested retail price of a comparable conventionally-fueled vehicle; and

(B) in the case of a leased vehicle, the difference between the monthly lease payment of such vehicle and the monthly lease payment of a comparable conventionally-fueled vehicle.

SEC. 202. APPLICATIONS.

(a) Not later than one year after the date of enactment of this Act, the Secretary shall request proposals to demonstrate electric vehicles or electric vehicles and associated equipment in one or more eligible metropolitan areas.

(b) Additional requests for proposals may be made if the Secretary determines that the responses to prior requests for proposals are inadequate. Requests for proposals under this section shall not require that proposals be submitted within any specified period of time in order to be eligible.

(c) The request for proposals shall require the proposals to include a description of the proposer, the manufacturer, the proposed users, and the eligible metropolitan area, the number of vehicles to be demonstrated and their type, characteristics, and life-cycle costs, the price differential, the proposed discount payment, the contributions of State or local governments and other parties

to the demonstration project, and any other information the Secretary requires to make selections under section 203.

SEC. 203. SELECTION OF PROPOSERS.

(a) After consulting with the Secretary of Transportation, the Secretary of Commerce, and the Administrator of the Environmental Protection Agency, and not later than 180 days after a request for proposals has been made under section 202, the Secretary may select one or more proposals to receive financial support pursuant to section 204.

(b)(1) The Secretary may not select more than a total of 10 demonstration projects under this section unless the Secretary determines that the total amount of funding available is not likely to be utilized by those demonstration projects which have been selected.

(2) No one project selected under this section shall receive more than 25 percent of the funds made available under section 206.

(3) A demonstration project may include electric vehicles in more than one eligible metropolitan area and in more than one State.

(c) In determining whether to select a proposal the Secretary shall consider—

(1) the ability of the proposer to undertake and complete the demonstration project described in the proposal;

(2) the ability of the manufacturer, directly, indirectly, or in combination with the proposer, to develop, assist in the demonstration of, manufacture, distribute, sell, service, and ensure the continued availability of parts for, electric vehicles that are proposed to be included in the demonstration project;

(3) the geographic and climatic diversity of the eligible metropolitan area or areas in which the demonstration project is to be undertaken, when considered in combination with other proposals or other selected demonstration projects;

(4) the suitability of the vehicles for use as a cargo or passenger vehicle;

(5) the environmental impacts of the proposed vehicles;

(6) the long-term technical and competitive viability of the electric vehicles, and the ability of the manufacturer to make and incorporate subsequent advancements, cost reductions, modifications, and technology improvements;

(7) the price differential and the proposed discount payment;

(8) the extent of involvement of State or local government and other parties in the demonstration project, and whether such involvement will permit a reduction of the Federal cost share per vehicle or will otherwise be used to leverage the Federal contribution to be provided among a greater number of electric vehicles; and

(9) other criteria as the Secretary considers appropriate.

(d) The Secretary shall require that—

(1) the electric vehicles will be used primarily in the eligible metropolitan area or areas identified in the proposal;

(2) the number of electric vehicles to be included in the demonstration project shall be no less than 100 vehicles, except that the Secretary may select a demonstration project with fewer than 100 vehicles if the Secretary determines that selection of such a proposal will ensure that there is geographic or climatic diversity of the proposals selected and that an adequate demonstration to accelerate the development and use of electric vehicles can be undertaken with fewer than 100 electric vehicles;

(3) as a part of the demonstration project the user or users of the electric vehicles will provide to the proposer and the manufacturer information regarding the operation, maintenance, and usability of the electric vehicles for 5 years after purchase or lease; and

(4) the proposer shall provide such information regarding the operation, maintenance, and use of the electric vehicles as the Secretary may request during the period of the demonstration project.

SEC. 204. DISCOUNTS TO USERS.

(a) The Secretary shall provide a discount payment to a proposer reimbursing the proposer for a discount provided to users if the proposer certifies to the Secretary, in such form and at such time as may be required by the Secretary, that—

(1) electric vehicles have been purchased or leased by a user in accordance with the requirements of this subtitle; and

(2) the proposer has provided to the user a discount in accordance with this subtitle.

(b) Not later than 30 days after receipt from the proposer of certification which the Secretary determines satisfies the requirements of subsection (a), the Secretary shall

pay to the proposer the full amount of the discount payment.

(c) The discount payment shall be—

(1) no greater than the price differential;

(2) no greater than the manufacturer's suggested retail price of a comparable conventionally-fueled vehicle; and

(3) used by the proposer solely to reimburse the user for the purchase or lease of an electric vehicle.

(d) The actual purchase price of an electric vehicle, adjusted to reflect the discount payment and any additional reduction that may result from contributions provided by other parties, may not be less than the manufacturer's suggested retail price of a comparable conventionally-fueled vehicle.

SEC. 205. REPORTS TO CONGRESS.

The Secretary shall annually report to Congress on the progress being made, through demonstration projects supported under this subtitle, to accelerate the development and use of electric vehicles.

SEC. 206. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to the Secretary to carry out this subtitle, $50,000,000 for the 10 fiscal year period beginning with the first full fiscal year after the date of enactment of this Act.

Subtitle B—Data Acquisition Program

SEC. 211. ESTABLISHMENT OF PROGRAM.

(a) Not later than 180 days after the date of enactment of this Act, the Secretary, in cooperation with appropriate State, regional, and local authorities, shall establish a data collection program to be conducted in at least 5 geographically and climatically diverse regions of the United States for the purpose of collecting data which would be useful to persons seeking to manufacture, sell, own, or operate electric vehicles or other clean alternative fuel vehicles. Such data shall include—

(1) identification of the number and types of vehicle trips made daily and miles driven per trip, including commuting, business, and recreational trips;

(2) the projections of the Secretary as to the most likely and most efficient complementary combination of electric vehicle or other clean alternative fuel vehicle use and other forms of transit, including rail and other forms of mass transit; and

(3) other appropriate demographic information and consumer preferences.

(b) The Secretary shall consult with interested parties, including manufacturers, public utilities, and State

or local governmental entities, to determine the types of data to be collected and analyzed under subsection (a).

Subtitle C—Federal Fleet Demonstration Program

SEC. 221. AMENDMENT OF THE ENERGY POLICY AND CONSERVATION ACT.

(a) Section 400AA(a)(1) of the Energy Policy and Conservation Act (42 U.S.C. 6374(a)(1)) is amended by striking out "or natural gas dual energy vehicles" and inserting in lieu thereof "natural gas dual energy vehicles, or electric vehicles".

(b) Section 400AA(g) of the Energy Policy and Conservation Act (42 U.S.C. 6374(g)) is amended—

(1) by striking out "and" at the end of paragraph (5);

(2) by striking out the period at the end of paragraph (6) and inserting in lieu thereof "; and"; and

(3) by adding at the end the following new paragraph:

"(7) the term 'electric vehicle' means a vehicle primarily powered by an electric motor that draws current from rechargeable storage batteries, fuel cells, or other sources of electrical current, and that may include a nonelectrical source of supplemental power.".

(c) Section 400AA(i) of the Energy Policy and Conservation Act (42 U.S.C. 6374(i)) is amended by adding at the end the following new paragraph:

"(3) There are authorized to be appropriated for the fiscal years 1994, 1995, 1996, 1997, and 1998 such sums as may be necessary to carry out this section.".

TITLE III—ELECTRIC VEHICLE INFRASTRUCTURE DEVELOPMENT PROGRAM

Subtitle A—Infrastructure Joint Venture Program

SEC. 301. DEFINITIONS.

For purposes of this subtitle—

(1) the term "infrastructure" includes support and maintenance services and facilities, electricity delivery mechanisms and methods, regulatory treatment of investment in electric vehicles and associated equipment, consumer education programs, safety and health procedures, and battery availability, replacement, recycling, and disposal, that may be required to enable electric utilities, automobile manufacturers, and others to support the operation and maintenance of an electric vehicle and associated equipment; and

(2) the term "non-Federal person" means an entity not part of the Federal Government that is

organized under the laws of the United States, the controlling interest (as defined by the Secretary) of which is held by United States nationals or permanent resident aliens, including—

(A) a for-profit business;

(B) a private foundation;

(C) a nonprofit organization such as a university;

(D) a trade or professional society; or

(E) a unit of State or local government.

SEC. 302. GENERAL AUTHORITY.

The Secretary shall undertake a program to enter into joint ventures with one or more non-Federal persons for cost-shared research, development, or demonstration of an infrastructure program or system designed to support the use of electric vehicles.

SEC. 303. SOLICITATION OF JOINT VENTURES.

(a) Not later than 240 days after the date of enactment of this Act, the Secretary shall solicit proposals for joint ventures. The Secretary shall select no more than 5 different proposals under this subtitle. The proposals to be selected by the Secretary shall represent geographically and climatically diverse regions of the United States. Within 180 days after proposals have been solicited, the Secretary shall select proposals and thereafter enter into

negotiations in order to obtain a final agreement where possible between the Secretary and the non-Federal person or persons submitting the proposal selected by the Secretary.

(b) The infrastructure programs for which joint ventures are selected under this section may be designed to address—

(1) the equipping of existing facilities, such as gasoline stations, automobile dealerships, and automobile repair centers, with the ability to service electric vehicles and to provide or service associated equipment;

(2) the installation of charging facilities at private residences, businesses, public buildings, airports, shopping malls, recreation areas, or other areas where such service might be required for the use and operation of electric vehicles;

(3) the feasibility of designing rate structures, rate levels, ratemaking procedures, billing systems, and financing methods related to investment by electric utilities in infrastructure capital-related expenditures;

(4) the conduct of information dissemination and public education programs designed to inform the public about electric vehicles;

(5) the development of safety and health procedures and guidelines related to—

(A) charging equipment and procedures;

(B) safety systems for battery gas emissions, including ventilation at parking facilities; and

(C) battery watering; and

(6) such other requirements as the Secretary considers necessary in order to address the infrastructure needed to support electric vehicles.

(c) The Secretary shall require at least 50 percent of the costs directly and specifically related to any selected proposal to be provided from non-Federal sources.

SEC. 304. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to the Secretary to carry out this subtitle not to exceed $10,000,000 for each of the 5 fiscal years beginning after the date of enactment of this Act.

Subtitle B—State and Local Incentives Programs

SEC. 311. ESTABLISHMENT OF PROGRAM.

(a) The Secretary shall, within 90 days after the date of enactment of this Act, issue regulations establishing guidelines for comprehensive State electric vehicle and other clean alternative fuel vehicle incentives and implementation plans designed to accelerate the introduction

and use of such vehicles. Such guideline shall address the development, modification, and implementation of such State plans and shall describe those program elements, as described in subsection (c), to be addressed in such plans.

(b) The Secretary, after consultation with the Administrator of the Environmental Protection Agency, shall invite the Governor of each State to submit to the Secretary a State plan within 180 days after the effective date of the regulations issued under subsection (a). Such plan shall include—

(1) provisions designed to result in scheduled progress toward, and achievement of, the goal of introducing substantial numbers of electric vehicles and other clean alternative fuel vehicles in such State by the year 2000; and

(2) a detailed description of the requirements, including the estimated cost of implementation, of such plan.

(c) Each proposed State plan, in order to be eligible for Federal assistance under this subtitle, shall describe the manner in which coordination shall be achieved with Federal and local governmental entities in implementing such plan, and shall include an examination of—

(1) the use of High Occupancy Vehicle (HOV) lanes for electric vehicles and other clean alternative fuel vehicles;

(2) exemption from State sales tax or other State or local taxes imposed on the purchase or operation of motor vehicles;

(3) the introduction of electric vehicles or other clean alternative fuel vehicles into State-owned or operated vehicle fleets;

(4) special parking at public buildings and airport and transportation facilities;

(5) programs of public education to promote the use of electric vehicles or other clean alternative fuel vehicles;

(6) encouragement of State agencies to examine the treatment of sales of electricity for use in electric vehicles or other clean alternative fuels for use in other clean alternative fuel vehicles;

(7) methods by which State and local governments might facilitate—

(A) the availability of clean alternative fuels, including electricity; and

(B) the ability to recharge electric vehicles at public locations;

(8) such other programs and incentives as the State may describe; and

(9) whether accomplishing any of the goals in this subsection would require amendment to State law or regulation.

SEC. 312. FEDERAL ASSISTANCE TO STATES.

(a) Upon request of the Governor of any State with a plan approved under this subtitle, the Secretary may provide to such State—

(1) information and technical assistance, including model State laws and proposed regulations relating to electric vehicles and other clean alternative fuel vehicles; and

(2) grants of Federal financial assistance for the purpose of assisting such State in the development of such plan or in the implementation of such plan or any part thereof.

(b) In determining whether to approve a State plan submitted under section 311, and in determining the amount of Federal financial assistance, if any, to be provided to any State under this section, the Secretary shall take into account—

(1) energy and environmental-related impacts of the introduction and use of electric vehicles or other clean alternative fuel vehicles included in the plan;

(2) the number of electric vehicles or other clean alternative fuel vehicles likely to be introduced by the year 2000 as a result of successful implementation of the plan; and

(3) such other factors as the Secretary considers appropriate.

SEC. 313. GENERAL PROVISIONS.

(a) In carrying out this subtitle, the Secretary shall consult with appropriate Federal departments and agencies.

(b) The Secretary shall report annually to the President and the Congress, and shall furnish copies of such report to the Governor of each State participating in the program, on the operation of the program under this subtitle. Such report shall include—

(1) an estimate of the number of electric vehicles and other clean alternative fuel vehicles in use in each State;

(2) the degree of each State's participation in the program;

(3) a description of Federal, State, and local programs undertaken in the various States, whether pursuant to a State plan under this subtitle or not, to provide incentives for introduction of electric vehicles and other clean alternative fuel vehicles; and

(4) the recommendations of the Secretary, if any, for additional action by the Federal Government.

(c) The Secretary, in consultation with appropriate Federal departments and agencies, representatives of State regulatory commissions and electric utilities, and such other persons as the Secretary considers appropriate, shall undertake or cause to have undertaken a study to determine the means by which electric utilities may invest in, own, sell, lease, or service batteries used to power electric vehicles.

SEC. 314. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated for carrying out this subtitle, $5,000,000 for each of the 5 fiscal years beginning after the date of enactment of this Act.

Mr. SCHEUER. At this time I would like to yield to members who have any further thoughts before we commence action on the bill itself.

Mrs. MORELLA. Mr. Chairman?

Mr. SCHEUER. Yes, Mrs. Morella?

Mrs. MORELLA. Thank you, Mr. Chairman.

I just wanted to add my commendations to you and to the Ranking Member and to the Subcommittee and to the Full Committee Chairman and Ranking Member of the Committee, because frankly, this is an excellent bill whose time really has come.

I mentioned during one of our hearings that I had the opportunity to drive an electric car during one of my environmentally-sound campaigns, and I know what can be done. The bill will help to expedite it in terms of its being an important part of the national energy strategy.

So, thank you, Mr. Chairman.

Mr. SCHEUER. Thank you very much.

I have a technical amendment I will offer at this time. The amendment has been distributed and is designated as Amendment Number 1. The Clerk will read the amendment.

Ms. FAUNCE. "Page 6, line 17, strike 'primary.'"

Mr. SCHEUER. All right. The Department of Energy has advised us that the term "primary batteries" could be interpreted as non-rechargeable, thus the amendment would strike the word "primary" to assure that the Congressional intent is clear.

[The amendment offered by Mr. Scheuer follows:]

SCHEUE061 1

AMENDMENT TO H.R. 1538
OFFERED BY MR. SCHEUER

Page 6, line 17, strike ``primary''.

Mr. SCHEUER. We will take a voice vote on the amendment. All those in favor, say aye.

[Chorus of ayes.]

Mr. SCHEUER. All those opposed, say nay.

[No response.]

Mr. SCHEUER. The ayes have it. The ayes have it and the amendment is passed.

I have two more amendments that I seek unanimous consent to offer en bloc. Is there objection?

[No response.]

Mr. SCHEUER. If not, so ordered.

These amendments deal with the funding authorizations in the bill for research, development, and demonstration. The amendments would adjust the authorizations in the bill to conform to the energy authorization legislation already approved by the Science Committee, and it would shift some of the outyear funding for research to the demonstration programs.

These amendments are explained in detail in the summary sheet which has been distributed to all members.

[The amendments offered en bloc by Mr. Scheuer follow:]

AMENDMENT TO H.R. 1538
OFFERED BY MR. SCHEUER

Page 9, lines 15 through 20, amend section 105 to read as follows:

SEC. 105. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to the Secretary to carry out this title $52,432,000 for fiscal year 1992, $68,000,000 for fiscal year 1993, $80,000,000 for fiscal year 1994, $85,000,000 for fiscal year 1995, $90,000,000 for fiscal year 1996, $95,000,000 for fiscal year 1997, and $100,000,000 for fiscal year 1998.

AMENDMENT TO H.R. 1538
OFFERED BY MR. SCHEUER

On page 16, line 23, strike "$50,000,000" and insert in lieu therof, "$100,000,000."

Mr. SCHEUER. Is there any discussion of the amendments offered en bloc?

[No response.]

Mr. SCHEUER. All right, then, we will take a voice vote. All those in favor, say aye.

[Chorus of ayes.]

Mr. SCHEUER. All those opposed, say nay.

[No response.]

Mr. SCHEUER. The ayes have it.

Are there any other amendments to the proposal before us?

Congressman Ritter, you have an amendment?

Mr. RITTER. Mr. Chairman, I have an amendment at the desk.

Mr. SCHEUER. The Clerk will read the amendment.

Ms. FAUNCE. "Page 14, line 16, insert 'in the case of automobiles or light duty trucks,' before 'the number of electric vehicles.'"

Mr. SCHEUER. All right.

Mr. RITTER. I ask unanimous consent that the amendment be considered as read.

Mr. SCHEUER. All right. Now, does anyone else wish to be heard? Why don't you speak to your amendment?

Mr. RITTER. Thanks, Mr. Chairman.

Mr. Chairman, at the May 16th Subcommittee hearing on H.R. 1538 we heard testimony about the need for demonstration projects that ensure the acceleration of development and use of electric vehicles. It also reflected the desirability of electric vehicles in a variety of geographic and climatic areas. Two witnesses, including the director of the transit authority in my Congressional district, testified that a variety of fleet-sizes in these projects is important.

My amendment would provide that variability in projects, where the demonstration fleet contains vehicles other than automobiles or light duty trucks would be allowed. It would direct the Secretary of Energy to determine the size of demonstration fleets for these vehicles, rather than prescribing rigid fleet size criteria.

The amendment will enhance the conditions needed to bring critical electric vehicle technologies for vehicles such as mini-buses, delivery vehicles, and vans to the marketplace in the near term.

It is basically an amendment that gives flexibility to the vehicle fleet size and distribution. Even a relatively small program could add significantly to the evaluation and demonstration of the electric vehicle concept.

I understand that the amendment has bipartisan support, Mr. Chairman, and I would urge its adoption.

[The amendment offered by Mr. Ritter follows:]

RITTER66

AMENDMENT TO H.R. 1538
OFFERED BY MR. RITTER

Page 14, line 16, insert ``in the case of automobiles or light duty trucks,'' before ``the number of electric vehicles''.

Page 14, after line 25, insert the following new paragraph:

(3) in the case of vehicles other than automobiles or light duty trucks, the number of electric vehicles to be included in the demonstration project shall be determined by the Secretary, in a manner so as to ensure that there is geographic or climatic diversity of the proposals selected and that an adequate demonstration to accelerate the development and use of electric vehicles can be undertaken;

Page 15, line 1, strike ``(3)'' and insert in lieu thereof ``(4)''.

Page 15, line 7, strike ``(4)'' and insert in lieu thereof ``(5)''.

Mr. SCHEUER. Are there any other comments on the proposed amendment?

The CHAIRMAN. Mr. Chairman?

Mr. SCHEUER. Yes, Mr. Brown?

The CHAIRMAN. I have reviewed the amendment and I agree with Mr. Ritter that this does add desirable flexibility to the Secretary of Energy, and I support the amendment.

Mr. SCHEUER. Is there any further discussion?

[No response.]

Mr. SCHEUER. All right, then, we will have a voice vote on the amendment. All those in favor, please say aye.

[Chorus of ayes.]

Mr. SCHEUER. All those opposed, say nay.

[No response.]

Mr. SCHEUER. The ayes have it. The ayes have it.

Does anyone have any further amendments to the bill?

[No response.]

Mr. SCHEUER. Does anyone have any report language they would wish to include in the committee report?

Mr. RITTER. Mr. Chairman?

Mr. SCHEUER. Yes?

Mr. RITTER. I do have some report language.

Mr. SCHEUER. All right. The Clerk will read the proposed language.

[The report language follows:]

PROPOSED REPORT LANGUAGE
H.R. 1538

OFFERED BY MR. RITTER

AUTHORIZATION FOR RESEARCH AND DEVELOPMENT (TITLE I)

With respect to the cooperative research and development program established under Section 102 of H.R. 1538, and authorized under Section 105, the Committee recognizes that the research and development component of the program at the Department of Energy will be conducted as an activity of the Office of Transportation Technologies, within the Office of Conservation and Renewable Energy.

Funding for the activities of the cooperative research and development program authorized by H.R. 1538 in the Office of Conservation and Renewable Energy is not intended to duplicate funds otherwise authorized for the Office of Transportation Technologies, if such legislation has been enacted into law. In particular, with respect to fiscal years 1992 and 1993, the Committee has passed legislation authorizing the R&D activities of the Office of Transportation Technologies (H.R. 2399, the Energy Technology Research and Development Authorization Act of 1991).

In the event that H.R. 2399, or other legislation authorizing funding for R&D activities for the Office of Transportation Technologies, is enacted into law prior to the enactment of H.R. 1538, it is the intent of the Committee that the funding provided for in Section 105 of H.R. 1538 be derived from amounts authorized for the Office of Transportation Technologies under such legislation.

Ms. FAUNCE. "With respect to the cooperative research and development program established under"—

Mr. SCHEUER. I would ask unanimous consent that the amendment to the committee report be considered as read and open for discussion.

Mr. RITTER. Mr. Chairman?

Mr. SCHEUER. Congressman Ritter?

Mr. RITTER. Mr. Chairman, this report language is intended to make clear that authorization for funding for the programs in the bill is not meant to duplicate that of other authorization bills for DOE programs involved. In other words, if the energy authorization bill which we passed out of the Full Committee for fiscal years 1992 and 1993, H.R. 2399, is enacted into law, or any other bill containing its provisions is signed into law, funding for the programs in Section 105 is intended to come from that authorization, not duplicated. In future fiscal years, the same idea would apply. It would be the intent of the Committee that there be no double counting.

Mr. Chairman, I understand this language also has bipartisan support, and I would urge full support of the report language.

Mr. SCHEUER. Does anyone have any objection to that report?

Congressman Brown?

The CHAIRMAN. Mr. Chairman, I do not have any objections. In fact, I support the report langauge. I take this time merely to indicate that there is a growing interest in both the House and the Senate in the possibility of passing more comprehensive energy legislation this year. The Senate has already acted on such, and the House is, in several different committees, giving consideration to this possibility.

I might say that in the event that a broader bill is passed, it is my hope—and I have received some encouragement on that—that the electric vehicle bill would be included as a part of that, and that there are other possible methods of funding, including the possibility of broadening the application of gas tax revenues, or an increased gas tax revenue measure, to include the possibility of funding a portion of this, at least, out of that.

So here again I think it is important that we maintain a degree of flexibility in terms of our approach to this so that we can get this program enacted in a fiscally realistic way at some time during the course of the year.

I thank the Chairman.

Mr. SCHEUER. Are there any members who would like to make statements—Congressman Wolpe?

Mr. WOLPE. Thank you, Mr. Chairman, just to indicate how pleased I am that we are going to move this legislation. I wanted to express my appreciation, both to you and Congressman Brown, for this very important initiative. I hope that it will be received favorably and quickly by this Congress.

Mr. SCHEUER. I thank my colleague from Michigan.

Mr. RITTER. Mr. Chairman?

Mr. Chairman, I just want to make a comment that there are some disagreements on our side on the size of the subsidy in the demonstration project, and also that the subsidy is making this choice between conventionally-powered vehicles and electric vehicles.

So I just wanted that to be laid out on the table at this point.

The CHAIRMAN. Would the gentleman yield?

Mr. RITTER. Yes, I yield to the Chairman.

The CHAIRMAN. I am glad the gentleman brought the point up that he did. There is always, of course, going to be debate over the nature of both the way funds are appropriated, the source of the funds and so on, and the degree to which they are made available to private entities for what the gentleman has referred to as "subsidies." It would be my preference that we substitute another word, like "cost- sharing" or something of that sort, which might be more acceptable.

The mechanism of this bill is quite in line with the other efforts which this committee has sponsored to encourage the private sector to cooperate with the public sector in funding developments which are necessary to the future of this country. Rather than calling those "subsidies," I would rather—for political reasons, obviously—encourage the idea that this is a cost-shared program with the private sector.

Mr. RITTER. If the gentleman would yield back, I hope we can work these concerns out at the Full Committee level.

I would like to point out that the regulatory costs of the latest Clean Air Act run into the tens of billions of dollars for a five-year period on ratcheting down tailpipe emission standards, and to some large extent we've done that, because the Southern California Basin has problems meeting the requirements of the Clean Air Act. A lot of people admit that even with the further ratcheting down and the expenditure of vast sums of money to equip all cars in America with the additional pollution control devices, we're still not going to solve the problem.

So it seems to me that, once again, as I mentioned earlier on—and the gentleman is intimately familiar with this—if you're going to really solve the problem in some of these difficult areas like the Los Angeles Basin, which has photochemical inversions, with the mountains in the back, it's got all the right contributions made for smog, you're going to have to go with something other than internal combustion engines. This is a real kind of drop in the bucket compared to what we're about to pay to somehow address this problem, and not yet solve it.

So I thank the gentleman for his contribution.

Mr. SCHEUER. Is there any further debate on the bill or the amendments thereto?

[No response.]

Mr. SCHEUER. All right.

Would you like to move final passage?

Mr. RITTER. Mr. Chairman, I move that the bill, as amended, be reported to the Full Committee with the usual instructions.

Mr. SCHEUER. Is there any debate?

[No response.]

Mr. SCHEUER. All right.

Mr. RITTER. Furthermore, Mr. Chairman, I move to instruct the staff to prepare the Subcommittee report and to make technical and conforming amendments, and that the Chairman take all necessary steps to bring the bill before the Full Committee for consideration.

Mr. SCHEUER. Is there any debate?

[No response.]

Mr. SCHEUER. All right. The question is then on the adoption of the gentleman's motion. All those in favor, say aye.

[Chorus of ayes.]

Mr. SCHEUER. All those opposed, say nay.

[No response.]

Mr. SCHEUER. The ayes appear to have it. The ayes have it. The bill is passed and forwarded to the full committee.

Is there any further business before the subcommittee?

[No response.]

Mr. SCHEUER. The meeting is adjourned at the call of the Chair.

[Whereupon, at 10:35 a.m., the subcommittee adjourned, to reconvene at the call of the Chair.]

MARKUP OF H.R. 1538—NATIONAL ELECTRIC VEHICLE ACT OF 1991

TUESDAY, JULY 30, 1991

U.S. HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Committee met, pursuant to notice, at 2:25 p.m. in room 2318, Rayburn House Office Building, Hon. George E. Brown, Jr. [chairman of the committee] presiding.

The CHAIRMAN. Good afternoon.

The Committee will come to order. I don't understand why there are so many people out here.

The Committee is going to take up several bills reported by the Subcommittee on Environment, and we're also welcoming two new members to membership in the Committee. I want to extend my personal warm welcome to new members Eliot Engel from New York—is he here—and John Oliver from Massachusetts. I thought John had been here before. He's not a new member anymore. He has already presided over the Committee, hasn't he?

[Laughter.]

The CHAIRMAN. And we look forward to working cooperatively with these two members. We certainly look forward to their substantial contribution to the committee.

Mr. SCHEUER. Mr. Chairman?

The CHAIRMAN. Who seeks recognition?

Mr. Scheuer?

Mr. SCHEUER. Mr. Chairman, I just want to say a very brief word about the new members. I've known Eliot Engel for many, many years, and I'm confident he will devote considerable attention to the important business of the Technology and Competitiveness Subcommittee, where he is serving. He will be an asset to the Committee.

Mr. John Olver will make an enormous contribution to the Committee with his background as professor of chemistry at UMASS. He is on my—I'm very happy and proud that he opted to come on the Environment Subcommittee. He is the only scientist on that Subcommittee, the only man with a truly first-class scientific background, and already he has made his mark as a scientist and also as a person deeply concerned with the environment and environment issues, which he demonstrated during his tenure in the State Legislature. He will surely enhance the deliberations both of our Subcommittee and of the Full Committee. I am delighted to welcome them both.

The CHAIRMAN. I thank you for those comments, though they do not require a response. I do wish to point out that Mr. Engel hasn't shown up, so you're going to have to be a little stronger mentor to him, Mr. Scheuer.

Mr. VALENTINE. Mr. Chairman?

The CHAIRMAN. Mr. Valentine?

Mr. VALENTINE. Mr. Chairman, I hope that this is appropriate. I would like to take this opportunity to welcome the two new members to our Subcommittee on Technology and Competitiveness. Both of them have exercised the extreme good judgment to seek the Subcommittee. Of course, I speak of our new colleagues, the Honorable Eliot L. Engel, a distinguished Democrat who represents the 19th district of New York, and the Honorable John W. Oliver, a Democrat who represents the 1st district of Massachusetts.

While these new members have missed a very busy and exciting time for the Subcommittee, we have enough to do to titillate both their imaginations and intellect and look forward to—I speak for all the members of the Subcommittee—we look forward to working with them and welcome them to our Subcommittee on Technology and Competitiveness.

The CHAIRMAN. Okay. Now that they've been welcomed and their new Subcommittee assignments have already been indicated, I think it might be appropriate to approve those new subcommittee assignments.

[Laughter.]

The CHAIRMAN. So I ask unanimous consent that the Honorable Eliot L. Engel be appointed to the Subcommittee on Technology and Competitiveness and that the Honorable John W. Oliver be appointed to the Subcommittee on the Environment and the Subcommittee on Technology and Competitiveness, effective immediately.

Is there any objection?

[No response.]

The CHAIRMAN. Hearing none, that will be the order.

We next will turn to H.R. 1538, the National Electric Vehicle Act of 1991. And since that is a bill which I have had a great deal of interest in, I would like to thank Chairman Scheuer and Congressman Ritter and other members of the Subcommittee for their work on behalf of the bill. The amendments agreed to in Subcommittee have served to strengthen what I consider to be a very important and very progressive piece of legislation. The additional five pages that I have here I will ask unanimous consent to put in the record.

[The prepared statement of Mr. Brown follows:]

STATEMENT OF

THE HONORABLE GEORGE E. BROWN, JR.

CHAIRMAN

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

JULY 30, 1991

46-207 O - 91 — 7

Page One

Good Afternoon. H.R. 1538, "The National Electric Vehicle Act of 1991," is before us after careful consideration by the Subcommittee on Environment. I would, first and foremost, like to thank Chairman Scheuer, Congressman Ritter and all Members of the Environment Subcommittee for their work on behalf of this bill. The amendments agreed to in Subcommittee have only served to strengthen what I consider to be a very important and very progressive piece of legislation.

For close to 25 years I have been involved in promoting the commercialization of electric vehicles. Now, I believe 1991 will be a watershed year. Following on the state and local initiatives in California and the Clean Air Act Amendments, industry in 1991 took the unprecedented step of forming the Advanced Battery Consortium to conduct collaborative R&D with utilities and battery manufacturers to develop a viable battery for markets in the mid to late 1990s. Advanced batteries are a key component to

our EV future. Other challenges include establishing a new infrastructure, developing new markets, and achieving consumer acceptance of this new technology. Developing the technologies and infrastructure represent a major national policy commitment. But it is a commitment that cannot wait. The cost of energy security and the environmental price we pay for using oil have become too high.

By 1989, the transportation sector was already using 33% more petroleum than is produced domestically. For the nation as a whole, imported oil now constitutes about 45% of our oil consumption. According to the Office of Technology Assessment (OTA), nearly 100 cities – housing close to half of the American population – do not meet federal ozone standards. Clearly this is a problem that affects not only our national well being, but also a multitude of local areas. A number of states are looking at the California experience and are initiating their own programs.

From New England to the Mid-Atlantic, recognition of common airshed problems is prompting concerted action. The benefits of any single state's adoption of stricter standards are shared by its neighbors, since both vehicles and air travel across state boundaries. Reports indicate that Illinois, Texas and Colorado are also interested in considering stricter standards.

The clear emergence of these state, local, and private sector activities offers an opportunity for the federal government to work in partnership to expedite commercialization of electric vehicle technology. Action at the national level will send a clear signal to the marketplace that the nation recognizes electric vehicle technology development and demonstration as a key element of energy and environmental policy.

H.R. 1538 attempts to overcome technical, market, and infrastructure barriers to electric vehicles by providing assistance for battery research and development, commercial demonstration

programs, and infrastructure development. The legislation was shaped from insights provided by a number of committed individuals and organizations -- including the big three automakers, the electric utility industry, and city and state governments throughout the country.

I am pleased by the broad support the bill has already received, and am especially excited by the support of my colleagues on this Committee and the Energy and Commerce Committee. It is my hope that we can move the bill to the floor of the House of Representatives as soon as possible.

I believe that with strong and united support from this Committee, that the momentum is powerful enough to pass this legislation and to enact a major piece of electric vehicle legislation into law.

We can move forward with a progressive piece of legislation; legislation that establishes a strong coalition of the public and

private sector. Too often Congress is accused of setting mandates and then abandoning ship, leaving it to the state and local governments to provide the mechanisms necessary to meet those mandates. I believe the Clean Air Act Amendments are too important to the health and welfare of our citizenry for Congress to jump ship. Passing an effective and significant electric vehicle bill will send a clear signal that the United States Government is a full partner in the fight to reduce emissions and clean up our air. I look forward to the markup and the eventual passage of this National Electric Vehicle Act of 1991.

The CHAIRMAN. Now, I will recognize Mr. Scheuer to make the Subcommittee report on the bill.

Mr. SCHEUER. All right.

I am very happy to present this bill and to give you your proper tribute, Mr. Chairman, for having been in on this issue from the beginning and having been a great leader in moving us to the point.

The CHAIRMAN. I appreciate that. I'm too modest to mention those things myself, but you will stoop to anything.

[Laughter.]

Mr. SCHEUER. That's the role of a Subcommittee chairman.

[Laughter.]

Mr. SCHEUER. Mr. Chairman, on June 25, the Subcommittee on Environment approved by unanimous voice vote H.R. 1538, the National Electric Vehicle Act of 1991. And furthermore, the subcommittee ordered H.R. 1538 reported to the full Committee on Science, Space, and Technology for further consideration.

H.R. 1538, introduced by Chairman Brown, the chairman of the Science, Space, and Technology Committee, addresses two of the most difficult challenges faced by our Nation: energy conservation and air pollution. The transportation sector of our economy accounts for more than 60 percent of all petroleum consumed in the United States, and more than 70 percent of that petroleum is consumed by passenger cars and trucks. Motor vehicles also account for almost 25 percent of all carbon dioxide emissions from fossil fuels, 400 million tons a year. Clearly, any serious effort toward increased conservation of energy and achieving major reductions in air pollution must include the transportation sector of our economy and H.R. 1538 squarely addresses both issues.

I urge my colleagues to adopt it.

The CHAIRMAN. Thank you, Mr. Scheuer.

The chair inadvertently failed to recognize Mr. Walker, the ranking Republican member, for any opening remarks that he may have, and I will do that at this time, and then recognize Mr. Ritter, the ranking Republican member of the subcommittee, for his comments.

Mr. Walker?

Mr. WALKER. Thank you, Mr. Chairman.

I will be brief, but I do want to emphasize the fact that we are very anxious on this side to work with the Full Committee in arriving at some consensus approaches to the matters that we have before us. I am somewhat disappointed that consensus has been broken in several instances here. I'm hopeful that we can begin to put together, through the amendment process today, the kind of consensus that will allow us to go to the floor with bills that will not inspire a lot of opposition. I think we have some very important areas here to address and it would be well to do it in a spirit of unity rather than in a spirit of partisanship.

So, I am hopeful that we can work out some of these matters before the Committee today, get the bills amended so that they can attract broad support, and we can go to the floor with the united Committee trying to push forward a research and development agenda in these very important arenas.

[The prepared statement of Mr. Walker follows:]

The three bills the Committee is to consider today are legislation all of us want to support. In fact, last year, I with the consensus of the Full Committee, supported reporting the Biodiversity and Indoor Air Acts. These were good, bipartisan bills that sought unity.

We will need that unity even more this year in dealing with all the complicated jurisdictional issues we face, and to get a chance at passage on a jammed House floor schedule. Unfortunately, this year, the Environment Subcommittee brings us bills that include new elements: controversial provisions that were not in last year's versions; not in the versions of the bills as introduced this year; and, are not even under the jurisdiction of this Committee.

Therefore, I will offer an amendment to each bill to reestablish the consensus we had last year. One goal is to assure that the authorizations are consistent with the Chairman's commitment that the Committee not authorize more than the total requested by the President under our jurisdiction. The other theme is not to legislate out of our proper research jurisdiction, especially regarding the imposition of technically unsupported, potentially onerous new government regulations.

Mr. Chairman, with the adoption of these amendments, I would recommend that the Committee report these bills. Otherwise, however, I can not.

The CHAIRMAN. We appreciate those comments from Mr. Walker.

I now recognize Mr. Ritter.

Mr. RITTER. Thanks, Mr. Chairman.

I want to commend you for your many years of dedication on this issue. It is largely through your efforts that a strong Federal effort in research and development in the electrical vehicle technology and infrastructure is today a reality.

I would also echo the concerns of our Ranking Republican on the Committee. I hope that we can make this, indeed, a bipartisan effort as we go forward.

Mr. Chairman, with electric vehicles predominant in your L.A. basin, it is conceivable that smog would no longer exist there. But, of course, that might have entailed a few more nuclear power plants to provide the electricity to plug into for those millions of people as they come home at night. So, I don't know.

[Laughter.]

Mr. RITTER. Mr. Chairman, our Nation faces a combination of deteriorating urban air quality and a heavy reliance on imported oil for transportation. Increased use of electric vehicles can attack both of these problems. Electric vehicles yield benefits to the environment by cutting the emissions of conventional vehicles by up to 97 percent. They can reduce the Nation's dependence on imported oil, depending on the fuel used to generate the electricity they use.

An unusual array of forces is spurring the development of these vehicles. Tough new air quality rules in some States, including California, virtually mandate a quota for new non-polluting vehicles. At the same time, major auto manufacturers have demonstrated an interest in electric vehicles, producing prototype models, such as the General Motors Impact.

The formation of U.S. Advanced Battery Consortium, involving utilities, battery manufacturers, and auto manufacturers, in partnership with the Department of Energy, is an extremely positive development. It's a step forward towards leaping the greatest hurdle to market acceptance of the vehicles and the fact that the technology—and that means the batteries—is not yet sophisticated enough at present to compete favorably with the powering of conventional vehicles.

The legislation, I think, places well its emphasis on advanced electric vehicle technologies. Title I of the bill spurs the develop-

ment of the key technologies. Title II and III, related to demonstration projects are important for electric vehicles. And, it's particularly important that a strong program of demonstrating these vehicles take place in a variety of urban areas, from smaller cities to larger ones, in a range of geographic and climatic situations.

The bill may well be a historic one, Mr. Chairman, for our Committee. With the right mix of Federal and private support in the next decade, it could be for electric vehicles what the 1980s were for the personal computer, a time in which promising technology emerges from the developmental stage to become a fixture in the homes of many Americans.

Once again, I would reiterate, however, that if you are dealing with millions, or tens of billions of electric vehicles, we are talking about significant amounts of centrally generated electricity at reasonable prices to consumers.

Mr. Chairman, I congratulate you and the Environment Subcommittee Chairman, Mr. Scheuer, and yield back the balance of my time.

The CHAIRMAN. Are there any other members of the committee who desire to make a statement on this point?

[No response.]

The CHAIRMAN. Any further discussion on the bill?

[No response.]

The CHAIRMAN. If not, the chair will recognize Mr. Ritter for a motion to adopt the subcommittee report.

Mr. RITTER. Mr. Chairman, I move adoption of the report and recommendations of the Subcommittee on Environment on H.R. 1538, the National Electric Vehicle Act of 199..

The CHAIRMAN. Is there any discussion on the motion? Any opposition?

[No response.]

The CHAIRMAN. Let me put the question.

All those in favor of the motion, signify by saying aye.

[Chorus of ayes.]

The CHAIRMAN. Opposed, no.

[No response.]

The CHAIRMAN. The ayes have it and the motion is agreed to.

The chair asks unanimous consent that the bill as reported by the Subcommittee be considered as an original text for the purpose of markup. And there being no objection to the chair's very reasonable request, it is so ordered.

Do any members wish to be heard before we recognize members for amendments?

[No response.]

The CHAIRMAN. If not, the bill is open for amendment.

The chair is going to offer an amendment on behalf of the gentleman from Alabama, Mr. Browder, who is unavoidably detained. This is marked as Amendment 1 in the amendment roster before the members.

Having offered the amendment, I suppose I should explain it.

What this does is to include the Administrator of NASA as one of those who will be consulted in connection with moving ahead on the development of batteries and electric vehicles.

I know of no objection to the amendment.

[The prepared statement, plus an amendment proposed by Mr. Browder follow:]

Statement by Congressman Glen Browder in introducing an amendment requiring the Department of Energy to consult with NASA as part of H.R. 1538

Tuesday, July 30, 1991

Mr. Chairman: My amendment specifies that the Administrator of NASA should be consulted along with the Administrator of EPA and the Secretary of Transportation. As the Committee with oversight for both science and space technology development, we are in a position to facilitate cooperation between agencies on activities that might otherwise seem to be going in different directions. We can assume the Secretary of Energy would look at NASA technology and programs for ideas useful in producing a comprehensive plan for development of electric vehicles. The exploration of space requires many of the same solutions that must be found to develop electric vehicles. Weight reduction, for example, and power production from self-contained sources (such as solar photovoltaic or fuel cells) are two areas vital to both pursuits. But why leave this to chance? The bill already recognizes the need to spell out where agency cooperation can be useful by requiring consultation with both the Administrator of EPA and the Secretary of Transportation. Obviously these two agencies should be consulted because of the nature of their work on environment and transportation. The connection to space technologies does not so readily suggest itself. Its specific addition would be an important contribution by this Committee to improving the bill.

AMENDMENT TO H.R. 1538
OFFERED BY MR. BROWDER

Page 6, Line 4, insert "Administrator of the National Aeronautics and Space Administration," after "Secretary of Transportation,"

The CHAIRMAN. Does any member wish to be heard on it?

[No response.]

The CHAIRMAN. If not, the chair will put the question on Amendment 1.

All those in favor, signify by saying aye.

[Chorus of ayes.]

The CHAIRMAN. Opposed, no.

[No response.]

The CHAIRMAN. The ayes have it. The amendment is agreed to.

The chair has an en bloc amendment. This is Amendment 2 on the amendment roster, and I ask unanimous consent that the amendment be considered en bloc.

There being no objection, it is so ordered.

This amendment merely gives the Department of Energy additional time in which to prepare the various plans and to meet the number of deadlines set out in the bill. This amendment is in response to written comments received by the Department of Energy, which I would include at this point in the record. These amendments are non-controversial and I understand that they have been cleared by the minority.

[The amendment proposed by Mr. Brown follows:]

BROWCA055

AMENDMENT TO H.R. 1538
OFFERED BY MR. BROWN

Page 7, line 4, strike ``90'' and insert in lieu thereof ``180''.

Page 7, line 9, strike ``180'' and insert in lieu thereof ``240''.

Page 10, line 19, strike ``180'' and insert in lieu thereof ``240''.

Page 19, line 1, strike ``240 days after the date of enactment of this Act'' and insert in lieu thereof ``1 year after funds are appropriated for such purpose under this Act''.

Page 20, line 24, strike ``90'' and insert in lieu thereof ``180''.

Department of Energy
Washington, DC 20585

JUL 09 1991

The Honorable George E. Brown, Jr.
Chairman
Committee on Science, Space, and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

Enclosed for your consideration are Department comments on H.R. 1538, "The National Electric Vehicle Act of 1991."

Although the recommendations made here are relatively minor, we believe they will aid considerably to make H.R. 1538 a more workable piece of legislation. Most of our concerns relate to timing. We believe, for instance, that inadequate time is permitted for development of proposals, regulations, and reports required by the Bill. In addition, the appropriation of funds is the most critical milestone prior to implementing the activities described in the bill, and that date should therefore be used as the start date, rather than the date of enactment. And finally, we believe that the requirement for 50% cost-shared programs with industry may unnecessarily limit private sector interest in higher-risk, longer-term research projects.

Thank you for your consideration.

Sincerely,

Reid Detchon for

J. Michael Davis, P.E.
Assistant Secretary
Conservation and Renewable Energy

Enclosure

Suggested Modification to H.R. 1538 (National Electric Vehicle Act of 1991)

Sec. 102(a)(4). "Primary" batteries could be interpreted as non-rechargeable. Strike the work "primary."

Sec. 102(b)(3). The preparation of a comprehensive plan of the scope required will require significant interface and coordination with many agencies and industrial organizations, as well as time-consuming reviews for comments and concurrence. 90 days for the time allowed for development and transmission of the plan to Congress should be changed at least to 180 days, and 270 days would be more reasonable for a well conceived plan. In addition, the clock should start "after funds are appropriated pursuant to this Act" rather than "after the date of enactment of this Act" since considerable funding will be required to develop the plan.

Sec. 102(c). The preparation of a request for proposals and the procurement actions and reviews required take considerable time and effort, particularly with cooperative programs. In addition, requests for proposals cannot be initiated until funds are appropriated. "180 days after enactment of the Act" should be changed to "240 days after funds are appropriated pursuant to this Act."

Sec. 102(d). Although significant cost-shared cooperative programs with industry are excellent targets, the requirement for at least 50 percent cost share by non-Federal participants will be restrictive in some high-risk technology areas. If the purpose of the Act is to include high-risk, long-term research projects, more flexibility may be required in cost sharing requirements--for instance" shall not exceed 50 percent unless..."

Sec. 202(a). The potential for demonstration of electric vehicles will be dependent on both the availability of the vehicles themselves (limited by the technology being developed) and the availability of substantial funding. Although we believe the early request for proposals is premature, it still cannot be initiated until actual funding is available. "Not later than one year after the date of enactment of this Act" should be changed to "Not later than one year after funds are appropriated pursuant to this section of the Act." Sec. 202(b) adequately covers the situation if vehicles are not available in this time frame.

Sec. 203(a). The time required for preparation of proposals by proposers, technical and financial evaluations, and consultation with other agencies will be considerable before selections may be made. "...Not later than 180 days after a request for proposals has been made..." should be changed to "...not later than 270 days after a request for proposals has been made."

Sec. 211(a). Since funding will be required to carry out the program under this section, "...not later than 180 days after the date of enactment of this Act..." should be changed to "...not later than 180 days after funds are appropriated pursuant to this Act."

Sec. 303(a). The infrastructure to be developed for electric vehicles is directly dependent on the vehicle performance parameters and the type of battery used in the vehicle. The safety, handling, charging characteristics,

and disposal of the batteries used will have major impacts on the infrastructure requirements. We do not expect that results from advanced battery development will have progressed far enough to allow effective guidelines for infrastructure development for at least two years. "...not later than 240 days after the date of enactment of this Act" should be changed to "...not later than one year after funds are appropriated pursuant to this section of the Act."

Sec. 311(a). The development and issuance of regulations for comprehensive State plans will require considerable effort and coordination. "...Within 90 days after the date of enactment of this Act" should be changed to "...within 180 days after funds are appropriated pursuant to this Act."

The CHAIRMAN. Are there members who wish to be heard on these amendments?

[No response.]

The CHAIRMAN. If not, the question is on the amendment.

All those in favor, say aye.

[Chorus of ayes.]

The CHAIRMAN. Opposed, nay.

[No response.]

The CHAIRMAN. The ayes have it, and the amendment is agreed to.

The chair has a second amendment which is listed in the members' amendment roster as Amendment 3. I will see if I can explain this briefly.

This amendment would require the Secretary of Energy to submit a report to Congress on methods for encouraging the use of electric vehicles, including means to reduce, share, or subsidize the high initial cost of batteries and replacement batteries. One of the hurdles of present battery technology, which is hindering its immediate acceptability is the high initial cost of batteries. We need some innovative thinking, such as the proposal that utilities rent batteries in order to save consumers the high initial capital outlay.

The study that this amendment proposes merely asks the Department to look at this issue and bring back suggestions, or legislation, or regulations to help address this issue.

[The amendment proposed by Mr. Brown follows:]

BROWCA054

AMENDMENT TO H.R. 1538
OFFERED BY MR. BROWN

Page 8, after line 6, insert the following new section:

SEC. 104. REPORT ON ENCOURAGING THE PURCHASE AND USE OF ELECTRIC VEHICLES.

Within 18 months after the date of enactment of this Act, the Secretary shall submit to the Congress and the President a report on methods for encouraging the purchase and use of electric vehicles. Such report shall focus on the potential cost of purchasing and maintaining electric vehicles, including the initial high cost of the batteries and the cost of replacement batteries, and shall identify methods for reducing, subsidizing, or sharing such costs. Such report shall also include recommendations for legislative and administrative measures to support and encourage the purchase and use of electric vehicles.

Redesignate subsequent sections accordingly.

The CHAIRMAN. Are there members who wish to comment on this amendment?

[No response.]

The CHAIRMAN. If not, the question is on the amendment.

All those in favor, say aye.

[Chorus of ayes.]

The CHAIRMAN. Opposed, no.

[No response.]

The CHAIRMAN. In the opinion of the chair, the ayes have it and the motion is agreed to.

We're going to get down to some controversial amendments here in a minute.

[Laughter.]

The CHAIRMAN. The chair recognizes the distinguished ranking minority member, Mr. Walker.

Mr. WALKER. Thank you, Mr. Chairman.

I hope this is not going to be controversial.

[Laughter.]

Mr. WALKER. I have a substitute amendment for the one that is in the packet, which is at the desk. This amendment essentially assures that the spending will come out of previously authorized funds, so that we are not creating a new spending category that will move us outside budgetary limits. It will simply assure that during the 10 years of the program, that we are talking about, that the monies would come out of previously authorized funds.

This is something that I believe we have worked out between minority and majority. It does not do as the original amendment suggested, cut the funding back from $100 million to $50 million. I began to realize that in doing that all we were really talking about was the period of authorization. In this case, it probably does make sense to give a 10 year authorization to the program at the appropriate rate.

That's essentially what this amendment does. So, I am hopeful that we will have approval of this approach.

[The amendment proposed by Mr. Walker follows:]

AMENDMENT OFFERED EN BLOC BY MR. WALKER

TO H.R. 1538, AS REPORTED BY

THE SUBCOMMITTEE ON ENVIRONMENT, ON JUNE 25, 1991

On page 8, line 17, after "1988." insert the following new sentence:

"Amounts authorized under this section shall be derived from sums otherwise authorized to be appropriated."

On page 15, line 14, after "Act." insert the following new sentence:

"Amounts authorized under this section shall be derived from sums otherwise authorized to be appropriated."

The CHAIRMAN. The chair would like to indicate that he has reviewed this amendment that Mr. Walker is submitting and while he sees certain difficulties from it, Mr. Walker's position is essentially correct, that we may be engaging in a dual authorization unless we've perhaps some appropriate corrective measure. This bill would attempt to solve that problem.

I am willing to run with it and see if it will do the job. If it causes problems later on, we'll consult and see what we can do to fix it.

Are there any other comments on this?

[No response.]

The CHAIRMAN. If not, the chair will put the question.

All those in favor, signify by saying aye.

[Chorus of ayes.]

The CHAIRMAN. Opposed, no.

[No response.]

The CHAIRMAN. The ayes have it, and the amendment by Mr. Walker is approved.

Are there any other amendments to the bill?

[No response.]

The CHAIRMAN. Are there any proposed Committee views or report language?

[No response.]

The CHAIRMAN. This is going much smoother than I thought.

[Laughter.]

The CHAIRMAN. The chair will recognize Mr. Walker for a motion.

Mr. WALKER. Thank you, Mr. Chairman.

I move the adoption of the report and recommendations of the Subcommittee on Environment of H.R. 1538, the National Electric Vehicle Act of 1991.

I'm sorry. That's already been done. I have the wrong motion.

Mr. Chairman, I move the Committee report the bill, H.R. 1538, as amended, and to instruct the staff to prepare the legislative report, make technical and conforming amendments, and that the Chairman take all steps to bring the bill before the House for consideration.

The CHAIRMAN. You have heard the motion. Is there any debate?

[No response.]

The CHAIRMAN. If not, the chair will put the question.

All those in favor, signify by saying aye.

[Chorus of ayes.]

The CHAIRMAN. Opposed, no.

[No response.]

The CHAIRMAN. The ayes have it, and the motion is agreed to and the bill is reported.

The chair now calls up for consideration H.R. 585, the National Biological Diversity Conservation and Environmental Research Act of 1991.

[The Committee then considered the bill H.R. 585, the National Biological Diversity Conservation and Environmental Research Act, and at 4:57 p.m. adjourned to reconvene at the call of the Chair.]

APPENDIX I

Written Testimony
of

THE ELECTRIC TRANSPORTATION COALITION

Submitted to the

Subcommittee on Environment
Committee on Science, Space and Technology
U.S. House of Representatives

May 16, 1991

The Electric Transportation Coalition, an ad hoc group of investor-owned and public utilities, rural cooperatives, major U.S. automakers, state and local governments, national associations and other public and private organizations, appreciates this opportunity to advise the Subcommittee of our strong support for H.R. 1538, the National Electric Vehicle Act of 1991. (A list of the membership of the Coalition is attached to this written statement.)

Overview

The Coalition supports H.R. 1538, which proposes important incentives to encourage the use of alternatively fueled vehicles. We believe that this approach is complimentary to mandates which force reductions or control of emissions. The Clean Air Act Amendments of 1990, stringent mobile source emissions requirements like those already adopted in California, and pending proposals for converting fleets to alternatively fueled vehicles, are examples of the significant number of mandatory programs in the clean fuel vehicle area already in place or under consideration. What is also needed to enable compliance with these mandates, are appropriate federal incentives through which the government can effectively work in partnership with the private sector to develop and commercialize electric vehicle technologies.

Overcoming the barriers to widespread use of electric vehicles calls for the creation of a comprehensive program such as that proposed in H.R. 1538.

I. Advantages of Electric Vehicles

When compared with fuels currently used in the transportation sector and with other potential alternative fuels, electricity and electric vehicles offer important advantages in terms of improving American energy security and air quality.

Furthermore, electric vehicles currently offer greater energy efficiency than current vehicles, and may well promise lower operation and maintenance costs.

Energy Security. Sixty-three percent of total U.S. oil consumption is utilized in the transportation sector. This is true despite very significant advancements in vehicle fuel efficiency in the last 15 years. Use of petroleum in the United States was approximately the same in 1989 as it was in 1974 because there are more vehicles on the roads traveling more miles annually. In addition, nearly one-half of the oil used in the U.S. is imported. Much of that oil comes from the Persian Gulf region making our nation especially vulnerable to price and supply shocks.

Electric vehicles offer an effective means to begin to reduce our reliance upon foreign oil sources. These vehicles have the advantage of using a "fuel" that is abundant, domestically produced, and generated from a variety of resources.

According to the Department of Energy, electric generating capacity is available today to recharge millions of electric vehicles without requiring the addition of new capacity. The DOE, in an August, 1990 study, concluded that during the period 1995-2000, more than 40 million (roughly 22% of vehicles currently registered in the U.S.) electric vehicles and electric hybrid vehicles (EHVs) could be recharged in the United States without increasing expected capacity. (It should be noted that this projection assumes that electric vehicle re-charging will occur largely during off-peak, nighttime hours.)

The use of electric vehicles could also produce substantial oil savings. Oil accounts for only six percent of this nation's electric power generation fuel mix. The Electric Power Research Institute (EPRI) has estimated that 1% electric vehicle market penetration could reduce oil consumption by 60,000 barrels per day. Also, DOE has calculated that if approximately 22% of total U.S. vehicles were replaced with electric vehicles and EHVs, nearly one million barrels of oil per day would be saved.

Environmental improvements. Electric vehicles qualify as a "Zero Emission Vehicle." These vehicles produce no tailpipe emissions and generate insignificant emissions resulting from operations (such as emissions from braking). One of the most important environmental characteristics of electric vehicles is that there is no emission system degradation over time, and no danger of tampering with emission controls. In fact, the only identifiable emissions attributable to electric vehicles are those associated with the generation of the power needed to charge electric vehicle batteries.

EPRI analyses have concluded, that given the current and projected electric generation mix, and when emissions at the powerplant are included, electric vehicles offer significant improvements over conventional gasoline-fueled vehicles with respect to emissions of various pollutants, including volatile organic compounds (VOCs) and carbon monoxide (CO).

Similar positive environmental impacts may be expected in the area of greenhouse gases. The World Resources Institute has estimated that if electric vehicles are charged by electricity produced from plants relying on the currently projected mix of fossil, nuclear and hydro generation in the year 2000, greenhouse gas emissions per mile driven would fall by 25 percent.

Other Advantages. Electric vehicles are projected to be more efficient than conventional gasoline powered vehicles. A 1989 EPRI study concluded that even near-term electric vehicles powered by lead-acid batteries are projected to be 25% to 40% more efficient than their gasoline counterparts.

As the World Resources Institute concluded in October, 1990 ("Reducing U.S. Reliance on Imported Oil: An Assessment of Alternative Transportation Fuels"):

> Electric vehicles are probably the most attractive option for the next decade or two. They offer distinct climate, air pollution and security benefits. . . . Although they are expensive today, increased research on better storage methods is expected to bring down prices in the coming years.

II. Status of Electric Vehicle Technology Today

Important new initiatives announced in recent weeks, provide us with greater assurances that technological advances in electric vehicles are being actively pursued. The increased level of effort by the major U.S. automakers gives reason for this optimism. As the Subcommittee is no doubt aware, the electric utility industry, the Big Three U.S. automakers and the Department of Energy are discussing a joint venture to pursue the development of electric vehicle batteries. Federal funding has already been requested to help support this undertaking, known as the "United States Advanced Battery Consortium."

In addition, electric vehicle development programs appear to have taken a prominent position in the business planning of the major automakers. This year alone, in addition to unveiling the Impact, a purpose-built electric vehicle, General Motors has designated a facility in East Lansing, Michigan as a potential site for future production of electric vehicles. Also, last

month, Ford Motor Company announced plans to proceed with the production of prototype electric vans powered by advanced sodium sulfur batteries. Earlier this year, Chrysler announced it was proceeding to develop a minivan using advanced battery technology for possible commercial production. These increased levels of effort by the major domestic automobile manufacturers evidence that the prospects for electric vehicle commercialization are improving significantly.

III. The Need for the "National Electric Vehicle Act of 1991" (H.R.1538)

Despite the number of encouraging activities now underway regarding electric vehicles, substantial barriers to development and widespread use exist. The Coalition believes that these barriers may be generally categorized into three areas: technical, market-based and infrastructure-related. The National Electric Vehicle Act of 1991, H.R. 1538, and its companion Senate measure, S. 886, will address these barriers and provide important -- although limited -- federal incentives. We urge prompt and favorable action on this legislation.

It has now been nearly 15 years since Congress first chartered a major federal effort focused upon the development of electric vehicles. Since that time, our national need for electric vehicles has grown, and we need a re-direction and rededication of federal efforts in electric vehicle and associated technology development.

To meet this need, Title I of H.R. 1538 authorizes the establishment of a program to conduct accelerated research and development of advanced technologies, including advanced batteries, to support electric vehicles. An important element of these proposed federal R&D efforts will be the requirement for cost-sharing by non-federal participants.

The seven-year R&D program proposed in the legislation would be based on a comprehensive plan to be prepared by the Department of Energy, in consultation with other agencies, including the Environmental Protection Agency and the Department of Transportation. This multi-agency approach recognizes the overlapping nature of the issues involved in electric vehicle technology development. We would hope that the plan produced would enable federal resources to be focused in those areas that are most needed, and where R&D efforts will contribute to advancing the day when electric vehicles are widely available. Non-federal entities are also given a role to play in the development of this plan, which should further assure a targeted R&D effort that addresses the areas of concern that are of most importance to the private sector.

The comprehensive electric vehicle research and development program should function as a framework to channel federally-directed efforts and to coordinate them with parallel efforts in the private and non-federal sectors. Federal resources will thus be leveraged by significant private funds to achieve common goals.

A second aspect of the R&D title calls for a technology transfer program. We believe that such an effort is essential, both to share information on technical issues among interested parties and to begin to lay the groundwork for the eventual use of electric vehicles in the United States.

Even as technological barriers are overcome, however, large-scale use of electric vehicles is not likely to follow unless the marketplace has been adequately prepared to accept this technology. Title II of the legislation addresses the need for market acceptance by creating several programs that are intended to accelerate user familiarity with electric vehicles. One important initiative is a nationwide program that will support as many as ten electric vehicle demonstration projects in various regions of the country. As the legislative proposal is currently structured, non-federal cost-sharing is an important and required element of the demonstration program. This feature of the legislation will assure that the private sector interest needed to sustain an electric vehicle market is created. The planned multi-year duration of the demonstration program should provide adequate time to permit technological advances to be incorporated.

The importance of a demonstration program to the introduction of a new technology cannot be understated. Vehicle owners and operators will continue to question the technical capabilities of electric vehicles. For too long, public perceptions of electric vehicles have focused on the inadequate technology introduced on a very limited basis in the 1970's. Changing these negative public perceptions requires reliable vehicles on the road -- across the country -- in sufficient numbers to produce convincing data and to carefully build consumer confidence in the technology. But we will not see vehicles on the road if the initial cost to potential users is far out of proportion with the cost of comparable, gasoline-powered vehicles. That is why the demonstration program provides limited federal funding to reduce initial vehicle acquisition costs.

The demonstration program of H.R. 1538 is also designed to assure that federal support will only be provided to qualified technologies. It emphasizes the use of vehicles in nonattainment areas, in recognition of the environmental benefits of electric vehicles. The number of demonstration projects that will be

supported is restricted, so that the available funding will be effectively used, and the number of vehicles to be involved in each project is set sufficiently high to provide for a realistic program. Also, the legislation will require that a responsible party -- be it a city or state, an electric utility or an automobile manufacturer -- conduct the demonstration program and assume the tasks of arranging for buyers or users of the electric vehicles, and assuring that data is collected and that the electric vehicles are used productively.

Title II is the successor to legislation introduced by Chairman Brown and others in the 101st Congress. It has been significantly revised to accommodate the concerns and criticisms which the Administration, and others, had of last year's legislation. The Coalition believes that this title is responsive to the concerns expressed last year and that these improvements make the proposed demonstration program a highly desirable mechanism for stimulating the early market acceptance of electric vehicles.

To assist in the identification of the most promising electric vehicle market, and the specifications for technologies that would meet expected market demand, H.R. 1538 also includes in Title II a data acquisition program. This federal program, to be coordinated with appropriate state, regional and local authorities, will produce information useful to potential electric vehicle manufacturers and marketers on the types of applications for which electric vehicles would be used, as well as demographic information and data on consumer preferences.

The legislation proposes amendments to the Alternative Motor Fuels Act of 1988 ("AMFA") which would permit electric vehicles to be included in the market-incentive provisions of that Act. Including electric vehicles as a part of AMFA is important to assure that the incentives, including federal fleet acquisition, available for other alternative fuels are equally available to electrics. H.R. 1538 also extends the duration of the AMFA program by five years, to allow time for advanced technologies, including electric vehicles, to be incorporated into the program.

Finally, the need to develop in a timely manner the "infrastructure" to operate, maintain and service electric vehicles is very important. Electric vehicle technology is different from what the average driver or fleet operator is used to, and it will be necessary to have a support structure in place to assist operators in making the transition to electric vehicles. Questions about vehicle recharging, servicing, routine maintenance, and battery disposal will arise. We must have answers to these questions before the public will feel confident in the use of electric vehicles. These support services cannot be put into place <u>after</u> the technology has matured. Rather, the

activities needed to develop the infrastructure for electric vehicles needs to be addressed concurrently as the technology is readied for the marketplace.

Title III of H.R. 1538 would create two infrastructure development programs. The Secretary of Energy would be authorized to enter into as many as five joint ventures with the private sector for cost-shared research, development or demonstration of infrastructure programs or systems for electric vehicles. Projects could address such diverse issues as

- equipping existing service stations to service electric vehicles;
- the installation of charging facilities in public and/or private parking areas;
- rate structures designed to encourage investment by electric utilities in infrastructure-related capital equipment; or
- public education programs.

Joint ventures selected for this program must represent geographically and climatically diverse regions of the country, to produce information that will facilitate the use of electric vehicles across the nation. Non-federal participants must provide substantial support -- at least 50 percent of the costs -- to leverage the federal funds that would be made available under the legislation.

H.R. 1538 also recognizes that state and local governments play a key role -- in many respects a leading role -- in the effort to get alternatively fueled vehicles onto the roads. The federal government should encourage all states to critically evaluate the prospects for the use of not only electric vehicles, but also other clean alternative fuel vehicles. H.R. 1538 would make federal information and technical and grant assistance available to those states that voluntarily commit to the development of electric vehicle and other clean alternative fuel vehicle incentive and implementation plans. The plans must be designed to assure introduction of electric vehicles and other clean alternative fuel vehicles into the state by the year 2000.

Conclusion

Many pending energy measures generally benefit alternative clean fuel vehicles. The status of electric vehicle development compared to other alternative fuel vehicle technology, coupled with the potential benefits of electric vehicles from an environmental and energy security perspective, warrants specific

incentives for electric vehicles. H.R. 1538 would provide such specific incentives. This legislation would, in the Coalition's view, be a highly effective means of encouraging electric vehicle development, thereby assuring that this new mode of transportation becomes available in the U.S.

ELECTRIC TRANSPORTATION COALITION
MEMBERSHIP LIST

May 13, 1991

American Nuclear Energy Council
American Public Power Association
City of Albuquerque
City of Chicago Department of Planning
City of Detroit
City of San Diego
Commonwealth Edison
Consolidated Edison of New York
District of Columbia Energy Office
Duke Power Company
Edison Electric Institute
Florida Power Corporation
Florida Solar Energy Center
Ford Motor Company
General Motors Corporation
Georgia Tech Research Institute
GPU Service Corporation
International Brotherhood of Electrical Workers
Los Angeles Department of Water & Power
National Rural Electric Cooperative Association
New York City Department of Telecommunications & Energy
New York Power Authority
Pacific Gas & Electric Company
Public Service Electric & Gas Company
Sacramento Municipal Utility District
Salt River Project
Solar Energy Industries Association
Southern California Edison
State of Colorado
Texas A&M University System
The Doe Run Company
Western Fuels Association, Inc.
West Virginia University